

Combined Sewer Overflow

The District's sewer system is comprised of both combined sewers and separate sanitary sewers. Combined sewers collect wastewater and storm water flow in a single system of pipes and transport it to a wastewater treatment plant. Storm water is water from rain or snow that washes off streets and parking lots. The major disadvantage of combined sewer systems is that during heavy rains, storm water flows exceed pipe capacity and cause an overflow into waterways through constructed overflow points. These constructed overflows prevent street flooding and backups into homes and businesses. However, the untreated water that overflows into the waterways adversely impacts water quality. Approximately one-third of the city is served by combined sewers with 60 permitted outfalls on the Potomac River, Anacostia River, and Rock Creek.

Non-Point Source Pollution

Nonpoint source pollution (NPS) is much broader and less simple to identify. It is defined as the pollution that cannot be traced to a single point (outlet or pipe) because it comes from many diffuse places. NPS mainly originates with storm water runoff when the overland flow washes off pollutants and deposits them in surface waters or introduces them into groundwater.

NPS is regulated by the Department of Health in the Division Watershed Protection (DC WPD). The Division includes sections for sediment and storm water, technical services, and inspection and enforcement. The NPS Plan of the WPD is promulgated in its approved *NPS Management Plan* (1989) and the *Nonpoint Source Management Plan II, Addressing Polluted Runoff in an Urban Environment* (2000). Plan II gives a comprehensive strategy for managing NPS by 2015 and additional uses by 2025 (DOC, 2005).

NPS pollution in the District is mainly caused by storm water runoff where the creation of new impervious surfaces is causing excessive runoff. In addition, NPS pollution originates from development and redevelopment activities, urbanization of surrounding areas, agricultural activities upstream in the watershed (DOH 2004a). Urban runoff is considered to be one of the major causes of impairment of all of the District's waters. Approximately 63% of the District is covered by impervious surface providing high potential for surface runoff and associated pollutant loads (EPA, 2005b). Construction usually includes redevelopment of abandoned areas, replacement of old buildings with new buildings, or rebuilding of roads. Depending on planning and inspection, construction activities can have a negative effect on water quality conditions. High runoff can also impact the hydrologic regime of streams, especially for small sub-urban and urban streams. Storm water runoff increases flood flows and velocities contributing to erosion and sedimentation. The erosion results in scoured streambeds and banks as well as a loss of riverine vegetation and benthic habitat. In addition, pollutants delivered by storm water degrade water quality and adversely effect resident aquatic communities. Urban runoff can carry nitrogen, phosphorus, heavy metals, toxic organic chemicals, petroleum-based oils, and floatable trash (Versar, Inc, 1997).

Impervious Surface Cover

Imperviousness, or the amount of impervious surface cover, is an important indicator for predicting impacts of land development on aquatic ecosystems. Studies have linked the amount of imperviousness to changes in the hydrology, habitat structure, water quality, and biodiversity of aquatic ecosystems. Increasing levels of imperviousness can change the hydrology of a receiving stream, increasing runoff volume and rate, and decreasing a receiving stream's capacity to handle floods.

For the purposes of this baseline study, impervious surface change in the District was estimated based on a comparison of remote sensing-derived impervious surface cover data layers for 1990 and 2000 (for methodology, see Jantz et. al, 2004). The data layers used provide satellite imagery-derived estimates of the percent of impervious surface cover for every 30 by 30 meter square area (or 30 meter 'grid cells') across the District. To identify areas of impervious cover change, the degree of impervious surface cover estimated in 1990 was subtracted from impervious surface cover estimates from 2000 for each 30 meter grid cell. From this calculation, the total acreage of areas showing greater than 10% change in impervious surface cover was then tabulated. **Figure 2.9** shows the impervious surface cover data layer for 2000 for current reference.

The results of the analysis suggest that between 1990 and 2000, approximately 1,852 acres in the District have experienced an increase in impervious surface cover of more than 10 percent. This represents 4.7% of the District land area. The greatest increase occurred in the Anacostia Waterfront area where it is estimated that almost 10% of the land area experienced greater than a 10% increase in imperviousness (**Table 2.17**). This increase is due development in the Anacostia corridor including the Southeast Federal Center and Washington Navy Yard.

Table 2.17 Change in Imperviousness 1990-2000

Planning Area	Acres	Change in Imperviousness (Acres)	Rate of Change in Level of Imperviousness (%)
1 - Upper Northwest-West	8092	455	5.6
2 - Upper Northwest-North	4556	132	2.9
3 - Mid-City	2069	43	2.1
4 - Near Northwest	2210	74	3.3
5 - Central Washington	2762	125	4.5
6 - Upper Northeast	5165	228	4.4
7 - Capitol Hill	1559	12	0.8
8 - Anacostia Waterfront	4059	384	9.5
9 - Anacostia and Upper Southeast	4709	276	5.9
10 - East Washington	4355	122	2.8
Total	39535	1851	4.7

Estimated Percent Imperviousness in the District of Columbia (2000)

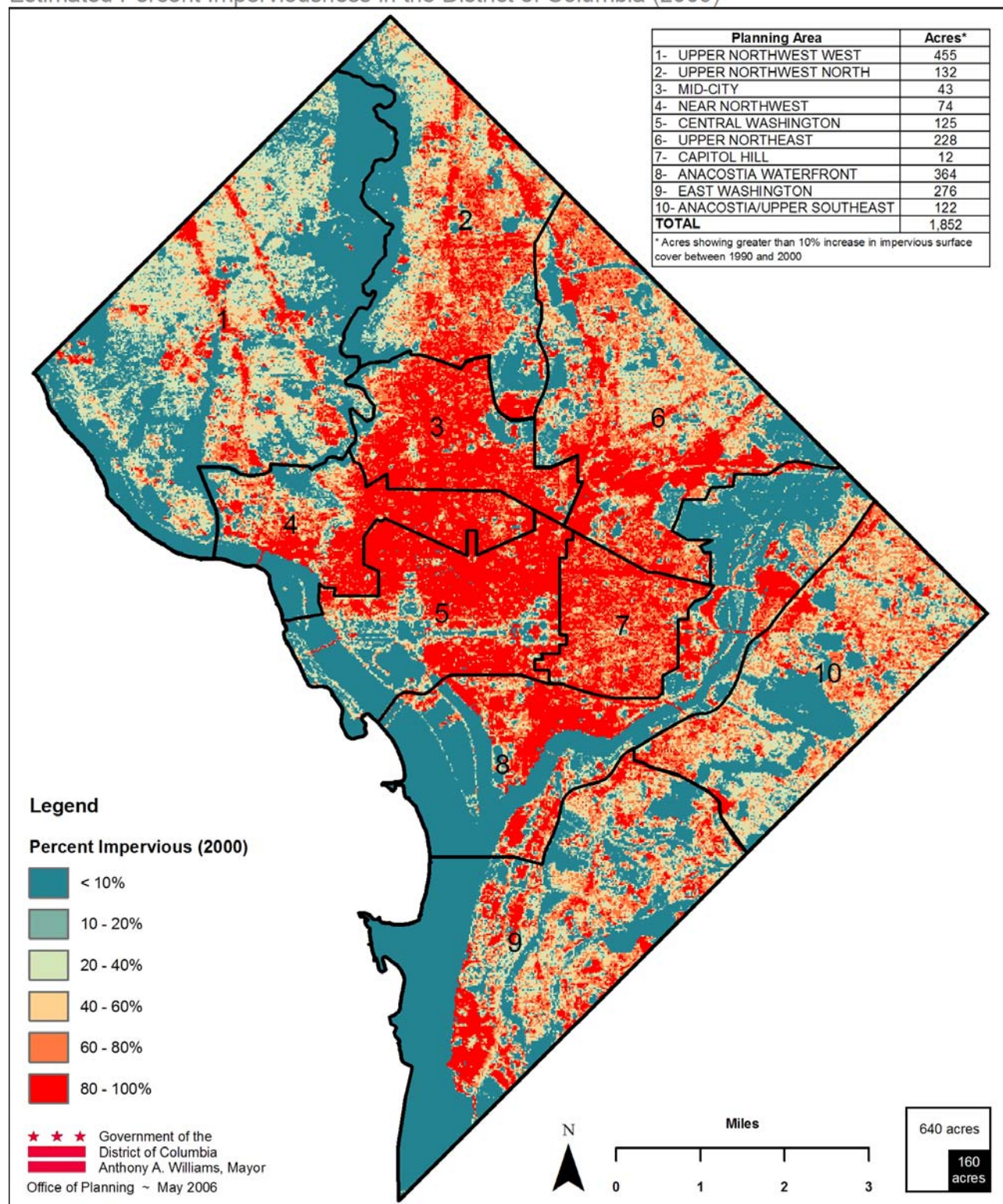


Figure 2.9 Estimated Percent Imperviousness in the District of Columbia (2000)

Drinking Water Quality

The 1974 Safe Drinking Water Act protects the quality of drinking water in every State. Under this Act, the Washington Aqueduct and WASA must conform to EPA mandated health and non-health related standards for the surface water supply. Regulated contaminants include microbial contaminants, inorganic contaminants, pesticides and herbicides (from agriculture, urban storm water runoff, and residential uses), and organic chemical contaminants, including synthetic and volatile organic chemicals, as well as radioactive contaminants. In 2003, the DOH conducted a Source Water Assessment of the Potomac River watershed and upstream of the water supply intakes. The assessment identified potential contamination sources and found that the most likely source of potential contamination to the water supply are urban runoff, toxic spills, agricultural activities and inadequate wastewater treatment (WASA 2004 Water Quality Report).

Waterbodies within the District of Columbia are not designated for either public water supply (PWS) or drinking water (DW) uses. Intakes from the Potomac River, located in Great Falls and Little Falls Maryland, supply the District's drinking water. The EPA water quality standards for drinking water are applied to DC's drinking water. Standards are applied to samples analyzed for turbidity, total coliform bacteria, chloride and other disinfection byproducts, inorganic metals, inorganic ions, and synthetic organic compounds (DOH, 2004).

According to water quality analysis data in 2001 and 2004, samples were in compliance with the majority of EPA criteria. Violations of the fecal coliform standard were recorded in the DC water once in 2004 as well as several times in 1995 and 1996. Disinfection of potable water used to be accomplished by use of free chlorine. However, since November 1, 2000, chloramines have been used instead, since free chlorine tends to bind with organic components to form potentially carcinogenic molecules such as trihalomethanes (THMs) and haloacetic acids (HAAs) (WASA, 2004).

Samples taken in 2001 showed that 4 out of 50 samples were above the EPA standard for lead (15 ppb). If 5 out of 50 samples are above the standard, then EPA regulations require that corrective action be taken (EPA, 2005 and WASA, 2004). Also, monitoring ending in 2002, 2003, and 2004 showed that more than 10% of the lead sampling test results exceeded the lead action level. As long as WASA continues to exceed the Lead Action level, federal regulations require the replacement of 7% of all lead service lines each year (EPA, 2005).

Raw water supply, treatment, and distribution systems do not contribute to increased lead levels in the DC WASA system. The presence of lead in tap water is the result of the laterals for individual service to locations from the water mains and lead leaching out or dissolving from the service pipes connecting the water main to the residence or from soldered fixtures in the home's internal plumbing. As a result, orthophosphate is being used to inhibit corrosion of lead and reduce lead levels. Also, DC WASA has an aggressive lead pipe replacement program. Test results show an overall decline in the lead concentrations in homes connected by service pipes treated with orthophosphate (Washington Aqueduct, 2005).

There are several other sources besides corrosion that can affect drinking water quality. For example, the Potomac River is subject to contamination by upstream activities. Soil runoff can

affect the water's turbidity, erosion from natural deposits can introduce inorganic contaminants, and herbicide runoff and discharge from chemical factories can introduce organic contaminants (EPA, 2005).

Groundwater Contamination

Groundwater contamination is usually caused by human activity but can also be encountered naturally as a result of leaching from rocks and soils (Fetter, 1999). Groundwater contamination usually occurs when contaminated water from an ambient groundwater aquifer or the vadose zone (unsaturated zone located on top of the groundwater aquifer) penetrates through unconsolidated sediments and rocks such as fissures and fracture zones. The cause of a contamination might be from point sources such as above and underground storage tanks, non-point sources such as pesticide application, or leaching from contaminants left behind from prior land uses, such as municipal solid waste disposal.

In the District, eleven major sources of potential groundwater contamination have been located, with eight listed on the CERCLIS list⁹. No information on groundwater contamination at these sites is known yet, since they are currently being investigated (DOH, 2004a).

Based on sampling data collected from the Potomac River Basin Study Unit between 1992 and 1996, nitrate, dissolved solids, volatile organic compounds, and pesticides were detectable in the groundwater in the District, but did not violate any criterion. However, radon, a noble gas considered to cause cancer, was found in 69 % of groundwater samples violating EPA's proposed standard in Federal Register, July 18, 1991 and November 2, 1999 (Ator *et al.*, 1998). Radon originates primarily from the decay of radium in metamorphic rocks and is highly volatile and therefore able to enter homes by **water or vapor intrusion**. The elevated radon concentrations are mostly found in areas underlain by crystalline rocks of the Piedmont Province (Ator *et al.*, 1998, Fetter, 1999). The proposed standard, however, does not apply to systems receiving their drinking water from surface water, in which radon concentrations are low (EPA, 2000). In a more recent study in 2002, DOH and USGS conducted a groundwater assessment of the Lower Anacostia Watershed analyzing organics, metals, biochemical and chemical oxygen demand, and suspended solids. The results support the finding by Ator *et al.* (1998) that generally only low levels of dissolved contaminants are found in District groundwater (USGS, 2003, DOH, 2004a).

⁹ The CERCLIS Database is the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) that contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities across the nation. The database includes sites that are on the National Priorities List (NPL) or being considered for the NPL.

2.3.4 TRENDS

Urbanization and growth are inevitable in the Anacostia and Potomac watersheds. Yet these two trends will continue to increase the amount of impervious surface in the District, and thus the resultant volume of surface runoff which scours and erodes stream banks and transports additional pollutants and debris from streets and parking lots into open water bodies. This influx of water is not able to be absorbed into the ground and filter into streams gradually. Rather, streams, creeks, and tributaries in the District exhibit extreme water levels which are detrimental to aquatic life. Aquatic life and water quality is also adversely affected by pesticides and fertilizers that are applied to lawns and gardens.

Sedimentation continues to be a critical problem in the Chesapeake Bay. Over the last century, the net deposition of sediment that entered the Maryland portion of the bay was 155 million metric tons (USGS, 1996). A variety of factors influence increased sedimentation rates, including land use changes. These sedimentation rates have been disruptive to the Chesapeake and have clouded the water to the impairment of SAV.

Although development and population growth continues to put pressure on water quality within the District, water quality in the city's rivers and streams has in many respects improved over the past two to three decades. These improvements come as the a result of a collaborative approach between District, Maryland and Virginia to improve the regional water. However, despite these improvements, the water quality within the District continues to suffer, and the vast majority of water bodies are classified as impaired. The District's smaller water bodies, like Rock Creek, are stressed. The Anacostia and Potomac rivers cannot support fish and other wildlife populations and their submerged aquatic vegetation (SAV) continues to struggle. The amount of SAV coverage dropped dramatically due to the excessive wet period from late 2002 through 2003 and the resultant decreased water clarity.

Phosphorus concentrations in the Potomac River in the Washington D.C. area have decreased since the 1970's. Similarly, ammonia and organic nitrogen loading has also decreased, and total nitrogen concentrations in the Potomac River have remained stable since the mid 1980's. These improvements are likely due to conservation measures such as the implementation of best management practices, improved wastewater treatment, policies that set goals for improving the bay such as the Chesapeake 2000 agreement, as well as the ban of phosphate detergents. Although many priority organic compounds such as chlordane or PCBs persist in the environment for long periods of time, many of these compounds are currently banned, and therefore no additional loading should be entering the Potomac River Basin.

Currently the greatest source for pollutants within the District is from combined sewer overflows. However, water quality within the District, has benefited from the separation of many CSOs, the construction of storage tunnels, and the implementation of improvements and biological nutrient removal at the Blue Plains wastewater treatment plant. These improvements to water quality throughout the District will continue as CSOs continue to be separated and improvements made.

2.4 BIOTIC RESOURCES

2.4.1 REGULATORY FRAMEWORK

Federal Legislation

Endangered Species Act (16 U.S.C. 35)

The Endangered Species Act of 1973 (ESA) requires Federal agencies to conserve plant or animal species that have been listed as endangered or threatened. Federal agencies are required to consult as necessary with the US Fish and Wildlife Service (USFWS) to ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction of or substantial damage to critical habitat. This consultation, derived from Section 7 of the ESA, is often referred to as the Section 7 consultation process. While this consultation is in progress, an agency must not make an irretrievable commitment of resources to its project. A consultation typically leads to the USFWS's suggestion of alternatives or mitigating measures that can be incorporated into the project, thereby allowing its completion.

Migratory Bird Treaty Act of 1918, as amended

The Migratory Bird Treaty Act of 1918, as amended, implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under this act it is prohibited, unless permitted by regulations, to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird” (16 U.S.C. § 703). Subject to limitations in the Act, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting or exporting of any migratory bird, part, nest, or egg will be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits and migratory flight patterns.

Federal Noxious Weed Act, 1975

The Federal Noxious Weed Act (7 U.S.C. 2801-2814, January 3, 1975, as amended 1988 and 1994) provides for the control and management of nonindigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.

Executive Orders and Executive Memoranda:

The following executive orders and executive memoranda address topics relevant to the protection of biotic resources.

Executive Order 11990, Protection of Wetlands (May 24, 1977)

This E.O. requires Federal agencies to take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agencies' responsibilities for managing and disposing of Federal lands and facilities.

Executive Order 13112, Invasive Species (February 3, 1999)

This E.O. directs Federal agencies to expand and coordinate their efforts to combat the introduction and spread of plants and animals not native to the United States. The Federal Highway Administration has developed guidance to implement the E.O. It provides a framework for preventing the introduction of and controlling the spread of invasive plant species on highway rights-of-way.

Presidential Executive Memorandum on Environmentally and Economically Beneficial Landscaping Practices (April 1994)

This E.M. directs agencies of the Federal government to follow principles for environmentally and economically beneficial landscape practices in order to improve their current landscape practices. These practices include use of regionally-native plants for landscaping; design, use, or promote construction practices that minimize adverse effects on natural habitat; seek to prevent pollution; implement water and energy efficient practices; and create outdoor demonstration projects. The FHWA has developed a guidance for this E.M. that states that at every opportunity where it is determined to be appropriate and cost-effective, the guiding principles of the E.M. to use native plants should be considered to the maximum extent practicable. The FHWA guidance defines what a native plant is and provides guidance on design, plant management and how to use native plants in roadside situations.

Multi-State Agreements:

Chesapeake Bay Agreement 2000

In June 2000, the Chesapeake Bay Program partners, comprised of the District of Columbia, Virginia, Maryland, and Pennsylvania, adopted the Chesapeake 2000 agreement, a strategic plan to achieve a vision for the future of the Chesapeake Bay. This vision includes abundant and diverse populations of living resources, fed by healthy streams and rivers, sustaining strong local and regional economies.

To restore an ecosystem as complex as the Chesapeake Bay requires work on many fronts. The agreement details nearly one hundred commitments important to Bay restoration, organized into five strategic focus areas, which include:

- Protecting and Restoring Living Resources
- Protecting and Restoring Vital Habitats
- Improving Water Quality

- Sound Land Management, and
- Engaging Individuals and Local Communities

District of Columbia Legislation

The Urban Forest Preservation Act of 2002 (D.C. Act 14-614) enacted on January 22, 2003

The Urban Forest Preservation Act established an urban forest preservation program requiring a Special Tree Removal Permit and community notification prior to the removal or replacement of a tree with a circumference of 55 inches or more, and established a Tree Fund to be used to plant trees and defray costs associated with the implementation of this act. The act makes it unlawful for any person or governmental entities, without a Special Tree Removal Permit issued by the Mayor, to top, cut down, remove, girdle, break, or destroy any Special Tree.

Departments and Agencies in the District of Columbia

District of Columbia Department of Health

The mission of the Environmental Health Administration is to prevent and control environmentally related diseases while protecting and preserving the ecological system in the District of Columbia. This administration is comprised of three bureaus: the Bureau of Hazardous Material and Toxic Substances, Bureau of Environmental Quality, and the Bureau of Community Hygiene. In addition, the administration also coordinates all multimedia requests/inspections, reviews submissions for requests received pursuant to the District of Columbia Environmental Policy Act, and represents the departmental environmental interest on boards, commissions, and committees, and provides staff support for all environmental outreach events sponsored by the Administration.

Two of the divisions are directly related to the protection of wildlife and the urban ecosystem. These include the divisions of Fisheries and Wildlife, in the Bureau of Environmental Quality, and Animal Disease Prevention, in the Bureau of Community Hygiene. The Fisheries and Wildlife Division has three major components: the Aquatic and Wildlife Education Branch, the Fisheries Research and Management Branch, and the Wildlife Management and Research Branch. Collectively these branches serve to monitor the District's aquatic and wildlife resources and to provide public education and outreach. The mission of the Animal Disease Prevention Division is to prevent and control the spread of diseases transmitted from animals to humans. The Division's services include, but are not limited to, animal disease control, rabies suspect control, stray animal control, dangerous dog control, licensing, enforcement, sterilization, and adoption.

District Department of Transportation (DDOT) Urban Forestry Administration (FUA)

The Urban Forestry Administration (UFA), formerly the Tree and Landscape Division, is located within the District Department of Transportation (DDOT). The mission of the Urban Forestry Administration is to manage and increase the District's street trees and to maintain healthy trees that provide: improved air quality; increased groundwater retention that minimizes runoff and

flooding; temperature moderation; aesthetics; and other benefits to the community. The UFA manages trees that line the District's roadways, and since 1999, UFA has planted 14,500 trees, pruned more than 40,000 trees, and removed approximately 7,000 dead or dying trees.

District of Columbia Department of Parks and Recreation

The Department of Parks and Recreation (DPR) operates and maintains a variety of recreational facilities to enhance the leisure and recreational opportunities in the Nation's Capital. DPR maintains over 381 acres of park land incorporating 354 parks and 71 playgrounds.

National Park Service

Most of the public parks in the District are administered by the Federal Government through the National Capital Region of the National Park Service. There are more than 6,700 acres of lands administered by the National Park Service in the District which includes 23 park sites (including monuments, memorials, and national historic sites). These include the Baltimore-Washington Parkway, Chesapeake and Ohio Canal NHP, Constitution Gardens, Ford's Theatre NHS, Franklin Delano Roosevelt Memorial, Frederick Douglass NHS, Korean War Veterans Memorial, Lincoln Memorial, Mary McLeod Bethune Council House NHS, National Capital Parks-Central, National Capital Parks-East, National Mall, National World War II Memorial, Old Post Office Tower, Pennsylvania Avenue NHS, Potomac Heritage National Scenic Trail, Rock Creek Park, Sewall-Belmont House NHS, Theodore Roosevelt Island, Thomas Jefferson Memorial, Vietnam Veterans Memorial, Washington Monument, and White House. The National Capital Region also administers several National Park System units in Maryland, Virginia, and West Virginia.

Characterization

For the purposes of this baseline study, three major urban land types are considered for their habitat value, including: parks and open lands, residential and commercial areas, and industrial lands. Within these major land types, a variety of specific niche habitats house wildlife typically found in urban areas. According to the recently completed District of Columbia Comprehensive Wildlife Conservation Strategy, there are approximately 782 species recorded within the District. Invertebrates comprise the largest percentage of the total number of species at 40%, while birds comprise over 30% of recorded species (DOHk, 2005).

Parks and Open Lands

Parks and open lands create habitats for the largest variety of wildlife species. With over 100



Small City Park Example: Lincoln Park

individual parks, open lands, and forested areas in the District totaling roughly 6,750 acres, these areas represent the highest quality of habitat areas available within the city for wildlife. For the purposes of this discussion, open area habitats not only include national, federal, and city parks but also include open lands on university campuses, golf courses, cemeteries, and other institutions.

Small City Parks

Within the District of Columbia, there are 231 triangle parks, 34 neighborhood parks, and 157 playgrounds/sports fields (DPR, 2005a,b). These areas are usually located along perimeter roads, along walkways, in neighborhoods, and near schools. They are typically used as recreational areas, and therefore experience high human traffic. The vegetation in these areas is predominantly composed of maintained grassy fields with low density tree cover, and may include garden plots, sparse woody vegetation, and a variety of landscaping shrubs.

Small city parks such as triangle parks (formed when diagonal avenues intersect with grid streets), neighborhood parks, and playgrounds/sports fields represent isolated habitats that support a range of common urban wildlife species (Growing DC, 2003). Wildlife expected to be found within these areas include eastern chipmunks (*Tamias striatus*), pigeons (*Columba livia*), grey squirrels (*Sciurus carolinensis*), mocking birds (*Mimus polyglottos*), common grackles (*Quiscalus quiscula*), European starlings (*Sturnus vulgaris*), gulls (*Larus* spp.), and English sparrows (*Passer domesticus*). Because many small parks have no aquatic ecosystems except for fountains, bird baths, or small ornamental ponds, few to no aquatic species are expected to be found outside of goldfish (*Carassius auratus*), koi (*Cyprinus carpio*), or other ornamental fish (StreamNet, 2005). Streams are typically piped under small parks resulting in a sparse or unhealthy benthic ecosystem.

An example of a small city park can be found in Capitol Hill (see graphic on previous page¹⁰). Typical park habitats in this area include a variety of urban triangles, medians, and squares, as well as Folger Park, Lincoln Park, Marion Park, and Stanton Park. Because these parks have no unique habitats, the birds and wildlife likely to be found in these areas are predominately those typical of urban neighborhoods. As an example, Lincoln Park is an eight acre city park located in the East Capitol Area bordered by 11th St, East Capitol, and 13th Street (GAO, 2005). Woody vegetation in the park is characterized by southern magnolias (*Magnolia grandiflora*), American beech (*Fagus grandiflora*), American elm (*Ulmus americana*), pin oak (*Quercus palustris*), white oak (*Quercus alba*), little leaved linden (*Tilia Cordata*), sugar maple (*Acer saccharum*), red maple (*Acer rubrum*), American holly (*Ilex opaca*), crape myrtle (*Lagerstroemia fauriei*), and winged euonymus (*Euonymus alatus*) (The Architect of the Capitol, 2005). Wildlife likely to be found within this park include eastern chipmunks (*Tamias striatus*), grey squirrels (*Sciurus carolinensis*) along with non-native bird species such as pigeons (*Columba livia*), European

¹⁰ All graphics presented in this section show an aerial image followed by a graphic depiction of the habitat being described. Scales for both image and graphic are identical and maintained for each habitat type described (excluding the graphic presented for Rock Creek Park). Aerial images were acquired in 2002 and were provided by DC OCTO. Graphic representations are a combination of GIS data layers including: tree point locations prepared by DC DOT and Casey Trees, forested and open land classes based on data prepared by American Forests, Inc., and planimetric road, side walk, and waterbody data layers provided by DC OCTO.

starlings (*Sturnus vulgaris*), and house sparrows (*Passer domesticus*). Trees and hedges may also provide nesting sites for several native bird species, including mourning doves (*Zenaida macroura*), American robins (*Turdus migratorius*), gray catbirds (*Dumetella carolinensis*), northern mockingbirds (*Mimus polyglottos*), crows (*Corvus brachyrhynchos*), blue jays (*Cyanocitta cristata*), Carolina chickadees (*Parus carolinensis*), and northern cardinals (*Cardinalis cardinalis*). In addition, a variety of migratory bird species have been recorded to briefly stop within this park to rest or forage during migration (USGS, 2005a).

Large Open Area Parks

Large open area parks include areas such as national monuments, golf courses, large graveyards, and open areas within institutional/large commercial properties. Large open area parks include areas such as the National Mall (See adjacent graphic), portions of college campuses, parks built on corporate sites, and federal government campuses. There are four golf courses within the District which are considered under this category which together account for more than 206 acres. In addition, the District of Columbia contains over 19 cemeteries and some, such as Mount Olivet are as large as 75 acres in size. Since these areas are often used for recreation, large open park areas tend to have a high amount of human activity effecting the wildlife composition.

The habitat available for wildlife species within open parks typically includes large areas of maintained grasses, some tree cover, shrubs, and both native and planted non-native annual and perennial plant varieties. Habitat edges are often distinct, with forested areas abruptly transitioning to broad areas of manicured grasses in areas such as golf courses and the National Mall. Areas that are infrequently maintained develop greater proportions of woody vegetation, often improving habitat structure and allowing for more diverse and abundant wildlife populations. In general, open area parks provide greater wildlife diversity than small parks.

Open park areas tend to contain similar wildlife compositions as small city parks. Wildlife species likely to occur within these parks include pigeons (*Columba livia*), grey squirrels (*Sciurus carolinensis*), mocking birds (*Mimus polyglottos*), common grackles (*Quiscalus quiscula*), European starlings (*Sturnus vulgaris*), gulls (*Larus spp.*), and English sparrows (*Passer domesticus*) (The Architect of the Capitol, 2005). White-tailed deer (*Odocoileus virginianus*) may also be found within these areas if the park borders forested land. In addition,



Large Open Area Park Example: The National Mall

migratory birds can be found within these areas. The *DC Birdscape*, a study which compiled a variety of data on neotropical birds in the District, showed that 67% of migratory avian species can be found in parkland which was composed of district and federal parks, recreation centers, and open space (Sauer et al. 1995). Ball fields and golf courses can provide foraging habitats for barn swallows (*Hirundo rustica*) and Northern rough-winged swallows (*Stelgidopteryx serripennis*) in the summer, as well as loafing and foraging areas for Canada geese (*Branta canadensis*) and ring-billed gulls (ring-billed gulls) throughout the year. Birds that may be found in open park areas located near waterbodies include: great blue herons (*Ardea herodias*), Canada geese (*Branta canadensis*), and mallards (*Anas platyrhynchos*). During the winter these birds may be joined by American coots (*Fulica Americana*), double-crested cormorants (*Corvus marinus*), buffleheads (*Bucephala albeola*), hooded mergansers (*Mergus cucullatus*), and ruddy ducks (*Oxyura jamaicensis* (USGS, 2005b).

Aquatic habitats in large open area parks include small to medium sized ornamental or highly modified ponds and streams. These habitats are likely to contain benthic communities with poor biodiversity due to urban runoff from the surrounding land use, as well as minimal aquatic vegetation as a result of maintenance. These aquatic habitats usually have little or no sediment cover at the bottom layer. Often the only fish species present in these managed habitats are goldfish (*Carassius auratus*) and koi (*Cyprinus carpio*) (StreamNet, 2005). Some turtle species, such as painted turtles (*Chrysemys picta*), may be found but in small populations.

One obvious example of a large open area park is The National Mall. The Mall is approximately 310 acres and has been called “America’s backyard.” It was originally created under L’Enfant’s Plan of 1791, and later declared a national park (NPS, 2005b). Vegetation cover in the park is mostly maintained grass, bordered by rows of American Elm (*Ulmus americana*) (Casey Trees, 2005). The National Mall contains many pedestrian crossways and a reflecting pool. This area is especially important to migratory birds since the wide open green space in the middle of an urban area attracts many of these birds as they pass through during migration.

Large Forested Parks

Large forested park lands can exceed 1,800 acres in size, and include such parks as Rock Creek Park, Kenilworth Gardens, the National Arboretum, Oxon Run, and Roosevelt Island. In general, these areas are dominated by forest cover, have some interspersed open maintained grassy areas, and support a greater diversity and proportion of native tree and shrub species.

Large forested park areas provide habitat for a variety of wildlife adapted to urban forest conditions, including grey squirrels (*Sciurus carolinensis*), whitetail deer (*Odocoileus virginianus*), red fox (*vulpes vulpes*) raccoons (*Procyon lotor*), and opossums (*Didelphis virginiana*). Avian species include those found in urban areas as well as larger populations of woodland and migratory bird species. In general, large forested parks support the most diverse and largest populations of urban wildlife.

Aquatic habitats within large forested parks include small streams and ponds, as well as river habitats for those found along the Anacostia and Potomac Rivers. Streams tend to have a greater biodiversity in these habitats than in other urban habitat types. However, biodiversity is still low compared to more natural condition due to impacts associated with urban runoff water quality,

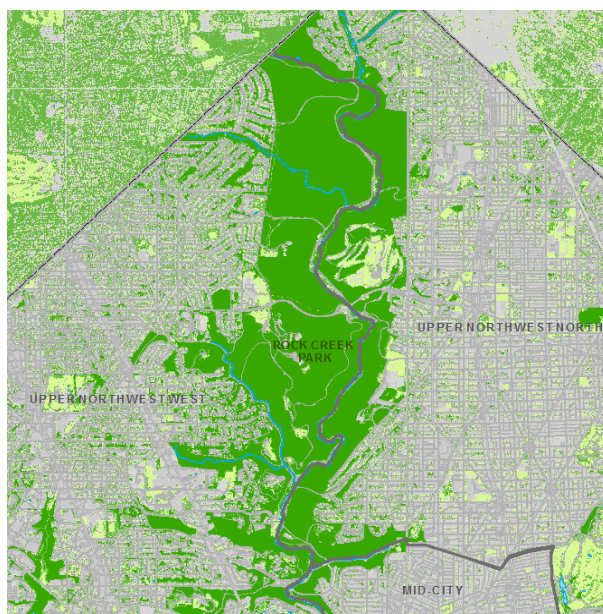
flow variability, and sedimentation. Fish species likely to occur within these streams include species that are tolerant to moderately tolerant of pollution and sediment.

Wetlands are most commonly found in the District within large forested parks and provide unique habitats for many animals and plants. Likely wildlife species to be found within wetlands include wood ducks (*Aix sponsa*), beaver (*Castor canadensis*), raccoons (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*). In addition, wetlands are valuable bird habitats used for breeding, nesting, rearing young, feeding, and social interactions (Stewart R.E., 2005). Many of the U.S. breeding bird populations, including ducks, geese, woodpeckers, hawks, wading birds, and many song-birds feed, nest, and raise their young in wetlands (CWP, 1997).

There are approximately 280 acres of vegetated wetlands within the District which are primarily found within protected park areas. Wetlands are commonly divided into the following four vegetative classes: forested (182 acres), emergent (37 acres), scrub/shrub (10 acres), and aquatic bed wetlands (51 acres). The largest remaining wetland areas within the Anacostia watershed are in the Kenilworth Aquatic Gardens and in the area opposite of the Aquatic Gardens on the west bank of the Anacostia River in the Fort Lincoln Complex (CWP, 1997).

Wetlands serve many functions, many of which counteract impacts associated with urban environments such as improving water storage capacity, transforming nutrients, growing living matter, and increasing biodiversity (Novitski R.P., Smith D.R., Fretwell J.D., 2005). The Center of Watershed Protection surveyed wetlands within the district and classified each wetland as having a “high”, “average”, or “low” relative value based on the diversity, quality and functionality of the wetland. According to this study, the wetlands in the National Arboretum and in Watts Branch Park are considered “average” relative value wetlands since they exhibit a lesser variety of vegetative species and strata and perform only a few common wetland functions. Together, these wetland areas comprise approximately 50% of the total wetland acreage within the city. In contrast, within the Potomac River watershed, the largest remaining wetlands are found in the C&O Canal Park, Theodore Roosevelt Island, and Rock Creek Park. Wetlands within these areas comprise approximately 30% of the total wetland acreage within the District and were ranked as “high value” by the Center of Watershed Protection since they provide a wide variety of vegetative species and strata, support diverse habitats, are minimally impacted, and perform most wetland functions. According to the same assessment methodology, “artificial” wetlands such as reservoirs and the reflecting pools are classified as “low value” resources since they exhibit poor diversity and limited wetland functions (CWP, 1997).

The largest forested park and contiguous forested area within the District is Rock Creek Park. Rock Creek Park is located in the center



Large Forested Park Example: Rock Creek Park

of the District and extends from the northern most boundary with Maryland through the middle of the city to the Potomac River. Vegetation coverage in Rock Creek has been extensively cataloged and includes managed grass and lawn, shrub areas, floodplains, ash swamps, and several types of forest. Major vegetative community types include mixed oak-beech (*Fagus grandifolia-Quercus alba/ Podophyllum peltatum*) forest, tulip poplar (*Liriodendron tulipifera*) forest, chestnut oak (*Quercus (prinus, Q. velutina)*) forest, sycamore- green ash (*Platanus occidentalis*) forest, loblolly pine/ mixed oak forest (*Pinus taeda- Quercus alba, Q. falcate, Q. stellata*) forest, Virginia pine-oak (*Pinus virginiana-Quercus (Q. alba, Q. stellata, Q. falcata, velutina)*) forest and blackberry/porcelain berry (*Rubus allegheniensis/ Ampelopsis brevipedunculata*) shrubland (USGS-NPS, 2005). Within Rock Creek Park, over 30 mammalian species have been inventoried. Examples of wildlife species include raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), grey fox (*Urocyon ciceroargenteous*), opossum (*Didelphis virginiana*), beaver (*Castor Canadensis*), grey squirrel (*Sciurus carolinensis*), eastern chipmunk (*Tamias striatus*), and white tailed deer (*Odocoileus virginianus*). In addition, over 180 avian species of breeding or migrating birds have been documented in Rock Creek Park including 33 of 34 warbler species found in the northeastern U.S. In addition, 9 reptile species including the northern ringneck snake (*Diadophis penctatus*), eastern box turtle (*Terrapene carolina*), and black rat snake (*Elaphe obsoleta*) have been recorded within the Park (NPS, 2005).

Rock Creek itself is home to approximately 35 species of fish. Eleven native species have been observed with the creek including the migrating blueback herring (*Alosa aestivalis*) and the alewife (*Alosa pseudoharengus*). The most recent biological assessments indicate that the tributaries of Rock Creek which flow through the urbanized areas of DC are more severely affected by urban runoff than the main channel (NPS, 2005a; DOH, 2002).



Residential and Commercial Areas

High Density Areas

High density areas include downtown city areas composed mainly of offices, apartments, and townhouses with a low amount of tree and herbaceous cover. The vegetation community within these areas includes street trees and some strips of maintained grass along sidewalks and street travel lanes. Wildlife populations within these areas are limited due to a lack of suitable habitat for most species. Streams within these areas are typically piped underground, and are therefore largely devoid of aquatic life.



**High Density Area Example:
Scott Circle**

Much of the District is comprised of high density urban and commercial areas. An example of these areas and the habitat they represent is Scott Circle. This area is dominated by office buildings with some small scattered street gardens. The most commonly occurring planted trees in this area include: willow oaks (*Quercus phellos*), Norway maples (*Acer pseudoplatanus*), American elm (*Ulmus rubra*), Pin Oak (*Quercus palustris*), and London Planetree (*Platanus hybrida*) (Casey Trees, 2005). Wildlife species likely to be found the Farragut North areas include Norwegian rats (*Rattus norvegicu*), grey squirrels (*Sciurus carolinensis*), mocking birds (*Minus polygottos*), and pigeons (*Columba livia*).

Moderate Density Areas

Moderate density areas are composed primarily of single family homes, townhouses, and commercial storefronts with small yards and gardens. These areas provide wildlife habitats that have slightly more vegetative cover than high density areas due to an increase in the abundance of gardens and green spaces between row houses. The vegetation community found in this habitat type includes mostly street trees and small yard areas with maintained grass, trees, gardens, and some cultivated shrubs along with perennial and annual plant varieties. Wildlife species within this area would include the same species as those found in high density areas with the possible addition of eastern chipmunk (*Tamias striatus*), raccoon (*Procyon lotor*) and opossum (*Didelphis virginiana*). Streams found within these areas would also be primarily piped underground, while those not underground are generally channelized and heavily impacted by urban runoff. Aquatic species diversity is generally low within these habitats.

Capitol Hill is an example of a moderate density residential area within the District that is comprised predominantly of row houses. The most common street trees found within this area include Norway maples (*Acer pseudoplatanus*), American elm (*Ulmus rubra*), sugar maples (*Acer saccharum*), and silver maples (*Acer saccharum*) (Casey Trees, 2005). Wildlife likely to be observed within this area include eastern chipmunks (*Tamias striatus*), grey squirrels (*Sciurus carolinensis*), Norwegian rats (*Rattus norvegicu*), pigeons (*Columba livia*), mocking birds (*Mimus polyglottos*), common grackles (*Quiscalus quiscula*), European starlings (*Sturnus vulgaris*), gulls (*Larus spp.*), and English sparrows (*Passer domesticus*) (Architect of the Capitol Study, 2005).



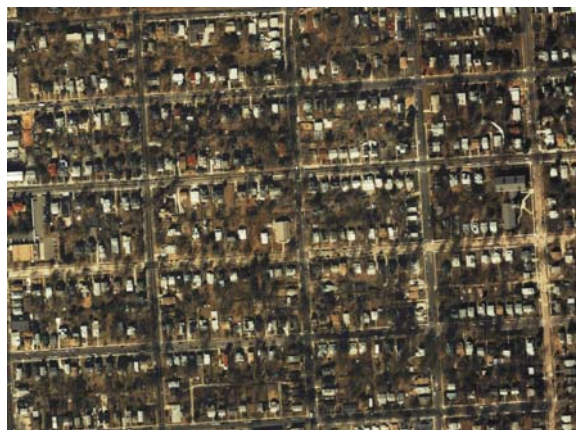
**Moderate Density Area Example:
Capitol Hill**

Low Density Residential Areas

Low density residential areas are comprised of single family homes with properties ranging in size between a quarter and half an acre. These areas contain more vegetative cover than moderate density residential areas and typically include more garden space. The vegetation found within these areas includes street trees and some small, primarily noncontiguous areas of woodland cover, maintained grass, gardens, shrubs and annual and perennial herbaceous species. Wildlife species that are expected to be found in these areas would be similar to those that are found in moderate density residential areas with the possible addition of red fox (*Vulpes vulpes*) and white tailed deer (*Odocoileus virginianus*) in areas adjacent to larger woodland areas. Some migratory birds may stop within these areas to frequent bird feeders.

Small streams and ponds found within low density residential areas would also be heavily modified, culverted, and channelized, in general providing only limited and poor aquatic habitat.

One area that can be considered low density wildlife habitat which is located in the Brookland area near Catholic University bordered by 12th Street, Newton Street, and Perry Street, NE. Houses within this area contain small backyards and gardens, with the proportion of vegetative cover noticeably greater than that observed in the high density residential areas. Street trees within the Brookland area are characterized by sugar maples (*Acer saccharum*), zelkovas (*Zelkova serrata*), and Norway maples (*Acer platanoides*). Wildlife likely to be observed within this area include eastern chipmunks (*Tamias striatus*), grey squirrels (*Sciurus carolinensis*), Norwegian rats (*Rattus norvegicus*), pigeons (*Columba livia*), mocking birds (*Mimus polyglottos*), common grackles (*Quiscalus quiscula*), European starlings (*Sturnus vulgaris*), gulls (*Larus* spp.), and English sparrows (*Passer domesticus*) (Architect of the Capitol Study, 2005).



**Low Density Residential Habitat:
Brookland**

Industrial Areas

Industrial areas in the District include harbors, rail-yards, factories, and waste areas. These areas are found clustered along the Anacostia River, stretching from Fort Lesley, SW, to the Washington Navy Yard, SE. Industrial areas consist of buildings, processing plants, and ship yards, which have very sparse vegetative cover and poor habitat value. Vegetation types expected in these areas include street trees in low densities and small patches of maintained grass.

Since industrial areas generally lack vegetative cover, they provide suitable habitat for only a few wildlife species. Many of the species present in these areas are considered pest species, and may include the Norwegian rat (*Rattus norvegicus*) and pigeons (*Columba livia*), as well as the grey squirrel (*Sciurus carolinensis*), seagulls. Aquatic habitats in the industrial areas include the Anacostia River, and may include underground piped streams.

One of the largest industrial areas in the District, the Washington Navy Yard, is the oldest Navy shore facility in America. Founded in 1799 on 66 acres of land, it was first used as a ship building facility, then a manufacturing facility during WWI. Presently, it provides administrative support for Naval services. The Navy Yard is located in Southeast, bordered to the South by the Anacostia River, to the north by residential housing, to the east by the industrial sector, and to the west by the General Services Administration. The Navy Yard consists of buildings, impermeable surfaces, and ports (GlobalSecurity, 2005). A very low density of vegetative cover is found within this site as well as very few wildlife species outside of those in the Anacostia River itself.

Industrial and former industrial areas, however, may offer great potential for habitat if they are remediated and reclaimed for open space and certain recreational uses.



Industrial Area Example: The Washington Navy Yard

2.4.2 PLANNING ISSUES

Urban Tree Cover Decline

Current Composition and Characterization of the Decline

Trees are an essential component of habitat in an urban environment, often serving as the primary source of food, shelter, and breeding habitat. **Figure 2.10** shows the distribution of tree cover within the metropolitan area based on a 2000 assessment of forest cover of the region by American Forests. Based on this analysis of land cover types, tree cover comprises approximately 28% of the District, while the remaining areas are comprised of impervious surfaces (41%), open space, grass, and scattered trees (19%), water (10%), and bare earth (2%).

Tree cover within the district is not evenly distributed throughout all areas of the city. The Upper Northwest area, with its National Parks such as Rock Creek Park and low density residential areas, has the highest proportion of forest cover (52%). Similarly, areas east of the River have a relatively high amount of forest cover at about 30%. These areas include Kennilworth Aquatic Gardens and Fort Dupont Park as well as several other larger park areas. In contrast to these areas, Central Washington and areas to the immediate north have the lowest amount of tree cover at around 10%. Similar low tree cover conditions also exist along the southern end of the Anacostia Riverfront.

Between 1972 and 1997, areas containing heavy tree cover decreased by 64%, mostly in ecologically important areas such as those bordering parklands. Specifically, high canopy tree cover during this time period decreased from 37% (16,440 acres), to 13% (5,871 acres). Over this same period, the District has been recorded as losing up to 25-30% of its street trees annually (Casey Trees, 2003). On average, street trees only live 7-10 years depending on the species and its ability to react to stresses from disease, injury, limited root space, lack of water and nutrients, poor soils, and poor drainage. It is estimated there are as many as 23,000 empty but available spaces for trees to be planted in the District.

Not surprisingly, the highest density of tree cover is found in forested parks. Loss of forest cover in these areas will result in a direct loss of habitat for resident species and may result in reduced habitat connectivity between smaller peripheral forested areas. Gradual tree loss and decline of forest cover on the edges of larger forested areas may also result in a reduction in the amount of available habitat for forest interior species in these areas.

In high and moderate residential and commercial areas, street trees are the primary habitat for several wildlife species. Because of this, the loss of one tree in a highly urbanized area causes more habitat degradation than the loss of one tree in an urban forest. Wildlife corridors within the District can exist in the form of connections between park areas via parkways, street trees, and small open areas. Parkway located within the district include: Glover Parkway, Palisades Parkway, a section of the Clara Barton Parkway, Beech Drive, Dalecarlia Parkway, Glover Parkway, Klinge Valley Parkway, Normanstone Parkway, Oxon Run Parkway, Pinehurst Parkway, Rock Creek Parkway and Shepherds Parkway. Decrease in the tree cover composition within both stream valley parks and automobile parkways could adversely affect wildlife from traveling between areas, negatively effecting not only species composition, but also population dynamics.

Tree Cover in the DC Metro Area

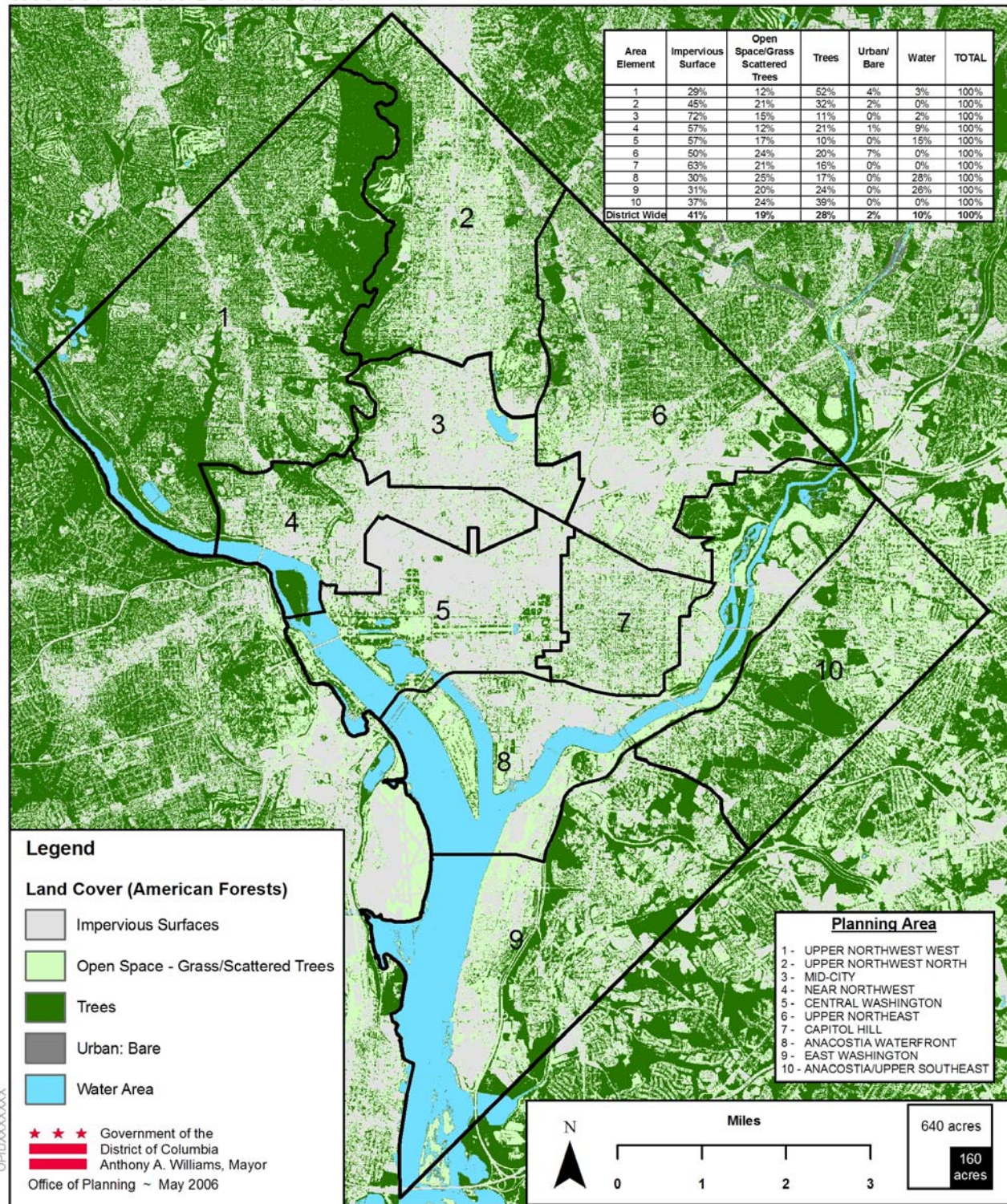


Figure 2.10: Tree Cover in the DC Metro Area

Aquatic organisms are also negatively impacted when trees are removed. Since trees provide stormwater retention, a decrease in tree cover allows for more urban runoff to affect the aquatic communities. Therefore tree planting projects throughout the city, and not just along the stream, are important in preserving and improving these urban habitats.

The Presence of Invasive Species

There is an abundance of exotic invasive species in the District including plants, wildlife, and aquatic species. Many of these species have been present within the area for several decades and comprise a large component of the area's flora and fauna. Non-native invasive species are able to spread rapidly due to a lack of predators, disease, and competition from native species. Since the District of Columbia is a highly urbanized fragmented landscape, invasive plant species tend to compose a large proportion of the population. Many of these species were originally ornamental species planted in gardens or parks and now have taken over other areas of the vegetative community.

Although several invasive species are mainly found in open disturbed areas, aggressive invaders can penetrate forests. This invasion can deplete wildlife food and habitat resources. In Rock Creek Park alone, more than one-third of the 656 documented plant species are non-native, and 41 of these species are considered aggressive which means they tend to spread and can eventually dominate large areas in just a few years. Ornamental vines such as English Ivy (*Hedera helix*), Asiatic bittersweet (*Celastrus orbiculatus*), and porcelain berry (*Ampelopsis brevipedunculata*) strangle trees along the edge of forest openings. Other species, such as Multiflora rose (*Rosa multiflora*) and garlic mustard (*Alliaria petiolata*), Japanese honeysuckle (*Lonicera japonica*), and Japanense Barberry (*Berberis thunbergii*) form dense thickets that out-compete native shrubs and ground covers. Lesser celandine (*Ranunculus ficaria*) and Japanese Stilt Grass (*Microstegium vimineum*) can found covering large areas of floodplains in Rock Creek Park (NPS, 2005).

Invasive species have also become well established in waterbodies surrounding the District. Common methods of introduction of these species into the river include the release of bait fish, unwanted aquarium fish, escape from aquaculture facilities, and discharge of ship ballast water. Impacts of invasive fish species on the ecosystem include competition with native species for food and habitat, reduction of natives by predation, and transmission of diseases or parasites. The USGS has recorded 10 exotic fish species within the Potomac River Drainage (USGS-NAS, 2005) including carp (*Cyprinidae spp.*), and snakeheads (*Channidae spp.*). In addition, over 50 species recorded within the Potomac watershed are considered to be native transplants.

Presence of Nuisance Wildlife Species

Along with exotic invasive species, other wildlife species have been noted as potentially affecting urban wildlife and their habitats. Species such as rats and raccoons, as well as stray dogs and feral cats, can negatively affect other wildlife through the spread of disease and attacks. Other animal species can pose a threat to urban habitats since they affect the success of reforestation especially in forested park areas. Species such as white-tailed deer, beavers, and voles can negatively affect forested areas by either damaging or destroying young trees, and or

interfering with the natural regeneration of the forests. If populations of such species such as white-tail deer reach a critical level, they can drastically impact vegetation composition.

The District has an abundance of park-like open spaces with short grass adjacent to small bodies of water, providing ideal habitat for the Canadian goose, which has led this normally migratory species into developing large resident populations within the city. Resident geese can become a nuisance as they can overgraze lawns and degrade water quality through the build-up of fecal matter that fosters bacteria and adds much nitrogen and phosphorus to waterbodies. In addition, along roadways and near airports, resident Canada geese have become a significant safety threat.

Within Rock Creek Park, monitoring has indicated that the deer population is approximately 59.4 deer/square mile (NPS, 2005). In comparison, forested areas in Maryland are reported to have around 15 deer/square mile in suburban areas and around 25 deer/square mile in forested areas (MD DNR, 2005). Night monitoring of deer in Rock Creek Park since 1996 has shown an annual increase of more than 31% per year. Data within the park has shown that deer appear to be reducing both vegetative density and species richness particularly for native species.

Effects of Pollution

The largest source of solid waste comes from high and moderate density residential areas. This waste is transported to a landfill in Lorton, VA, rather than being dumped in the district. Prior to 1996, waste and recycling collection occurred biweekly. Since 1996, residential solid waste is collected once a week and recycling is collected every two weeks. Residential waste production has not decreased, and as a result, the District's residential areas currently contain more waste in trash cans and dumpsters today than in 1996. This trash is an attractant for scavengers who may be found in curb-side trash cans, inside the resident's house, and in dumpsters in alleys. Scavenger species typically found in the District include grey squirrels (*Sciurus carolinensis*), pigeons (*Columba livia*), Norwegian Rats (*Rattus rattus*), and raccoons (*Procyon lotor*) (Davies and Darnall, 1996)

Another source of residential waste comes from illegal dumping in the District. These dumps are primarily located in the Northeast and Southeast sections of the city. It is estimated there are over 200 illegal dumps within the District. In one case, an illegal dump in 1995 resulted in the evacuation of three apartment buildings in a public housing development because it contained toxic chemicals. These dumps may attract the same wildlife as above, however illegal dumps pose a greater threat to wildlife due to the potential for toxic contamination. Runoff from these dumps may be carried to aquatic habitats, compromising the water quality (Versar, 1997).

Aquatic/Sediment Pollution

Pollutants are carried by litter, automobile exhaust, machinery discharge, exterior paints, lawn fertilizers, and animal droppings. Runoff from rain events transport metals, oil, toxic substances, bacteria, and sediments which may already be polluted. This runoff primarily ends up in the Anacostia River, though in the year 2000, the EPA estimated that approximately 700 million gallons of sewage entered the Potomac from the District (Carey R., 2001). Water contamination is also occurring due to combined sewer overflows (CSOs), which are contributing organic and toxic substances into District waterbodies (Versar, 1997).

An excellent indicator of water and waterbed sediment quality for biota is benthic macroinvertebrate communities. The composition of these communities usually reflects the expected conditions for thriving aquatic habitats. Most macroinvertebrate communities were rated as fair to poor in the Potomac River, Anacostia River and tributaries, and in Rock Creek and its tributaries. Habitat and biological assessment studies show that locations throughout the watershed have been impacted by high nutrient levels and isolated toxic effects (Versar, 1997). Currently, only 36% of the District's rivers and streams support aquatic life.

Sensitive Species

Since the District is highly urbanized and developed, many sensitive species recorded within the District are considered threatened, endangered, or species of greatest conservation need.

USFWS Threatened and Endangered Species

The US Fish and Wildlife Threatened and Endangered Species System database is continually being updated to reflect new research. As of December 29, 2005 through March 10, 2006, there are seven federally protected listed wildlife species in the District: the bald eagle, Hay's Spring amphipod, eastern puma, American burying beetle, curlew eskimo, dwarf wedgemussel, and grey wolf. Although these species may be listed for the region, the urban environment of DC does not provide suitable habitat for four out of these seven species (**Table 2-18**). The small whorled pogonia, a threatened plant species, is also listed in the District (NatureServe, April 2006).

Table 2-18: USFW Threatened and Endangered Species Listed for the District			
Species	Status	Local Habitat*	Threats*
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Threatened	Rock Creek Park, Kenilworth Park, Anacostia Park, Oxon Cove Park, and the Fort Circle Park Areas	Loss of limited breeding habitat and disturbance to breeding pairs.
Hay's Spring Amphipod (<i>Stygobromus hayi</i>)	Endangered	Found in Rock Creek Park in 5 groundwater springs	Predators, alterations of flows, groundwater pollution, disturbance
Puma, eastern (<i>Puma concolor cougar</i>)	Endangered in North East but extirpated in DC	N/A	N/A
Beetle, American burying (<i>Nicrophorus americanus</i>)	Endangered in North East, but extirpated in DC	N/A	N/A
Curlew, Eskimo (<i>Numenius borealis</i>)	Endangered in North East, but extirpated in DC	N/A	N/A
Wedgemussel, dwarf	Endangered	The Potomac River	Pollution and habitat

Table 2-18: USFW Threatened and Endangered Species Listed for the District

Species	Status	Local Habitat*	Threats*
(<i>Alasmidonta heterodon</i>)			disturbance
Wolf, gray (<i>Canis lupus</i>)	Endangered in North East, but extirpated in DC	N/A	N/A

* Source: DOH k, 2005

Species of Greatest Conservation Need

In the District of Columbia Comprehensive Conservation Strategy, the DOH Fisheries and Wildlife division designated wildlife species within the District requiring the greatest conservation need. Prioritization of these species was based on input from neighboring states with which the District shares priority species and habitats, and with entities such as the Rock Creek Park and the National Capital Parks, US Fish and Wildlife, National Heritage Program, and the American Fisheries Society. In order to make best use of funds, any species that was considered unfeasible to conserve was not included on the list.

Out of a total of 782 wildlife species inventoried by DOH, 182 (19%) were placed on the list of species of greatest concern. Of these species 34% are invertebrates, 24% are birds, 16% are amphibians, 8% are fish, and 7% are mammals. Invertebrate species listed include, copepods, butterflies, dragon and damselflies, and amphipods. Bird species added to this list included many migratory species for example, the Cerulean Warbler, since maintaining the integrity of a migratory stopover point such as the District benefits the entire migration path of the species. Resident and breeding fish species such as the American Shad, a threatened fish species, were also included on this list (DOH k, 2006).

Since the most effective way to protect a species is to preserve its habitat, this comprehensive plan also includes a prioritized list of 13 important habitats that should be protected based on the number of species of greatest conservation need living within each habitat. The habitat given the greatest conservation priority were rivers followed by hardwood forests, emergent non-tidal wetlands, grasslands, forested wetlands, early successional forest, emergent tidal wetlands, urban landscapes, tidal mudflats, springs and seeps, submerged aquatic vegetation, and vernal ponds and pools (DOH k, 2006).

Sensitive Avian Species

Migratory species such as birds and fish pass through the District, and in certain habitat areas can be found in large populations. There are over 325 species of birds recorded within the District. The DC Birdscape, which is one study that was conducted in the city between 1993 and 1995 listed over 46 species of birds that were considered migratory (1997). According to the Maryland Ornithological Society, bird ranges can change over time even without obvious or extensive habitat or climate change. As a result, new studies such as the Maryland/DC bird breeding project, are currently being conducted to see how the bird populations are changing in the District (MOS, 2005). Park areas within the city provide habitat for migrant, breeding,

resident, and wintering birds. The ridge of forested land that borders the west bank of Rock Creek between Broad Branch and Military Roads is the best warbler “trap” in the city (Wilds, 1992). The combination of a north-south ridge of forested land, its location on the Fall line dividing the Piedmont and Coastal Plain physiographic regions, as well as its function as open space in the center of an urban area, serves to concentrate migrant land birds during spring and fall (Wilds 1992). Neotropical migrants are those avian species that breed in the United States and Canada and winter in Mexico, Central America, South America or the Caribbean Islands (Smithsonian Migratory Bird Center 2003). Wintering and resident species are surveyed annually during the Washington, DC National Audubon Christmas Bird Count.

In addition to the federal, state, and heritage lists, the National Audubon Society published a Watch List in 2002 based on scientific assessments that categorized avian species into red, yellow, and green lists based on severity of threats and population decline. The golden-winged warbler is a red-listed species declining rapidly and facing major conservation threats; yellow-listed species include blue-winged warbler (*Vermivora pinus*), bay-breasted warbler (*Vermivora pinus*), Canada warbler (*Dendroica castanea*), Kentucky warbler (*Oporornis formosus*), prairie warbler (*Dendroica discolor*), prothonotary warbler (*Protonotaria citrea*), olive-sided flycatcher (*Contopus cooperi*), willow flycatcher (*Empidonax traillii*), and wood thrush (*Hylocichla mustelina*). Yellow listed species are those with populations declining at a rate less than those in the red category. There have been substantive changes to avian species present within the District of Columbia since 1998 (pre-permit conditions) with the introduction of West Nile Virus into the avian population.

Sensitive Fish Populations

Fish populations in the District have also been declining, especially migratory fish. Compared to historic levels, species abundance and diversity has declined. Hickory shad (*Alosa mediocris*), white and yellow perch (*Morone americana* and *Perca flavescens*), red-breasted sunfish (*Lepomis microlophus*), striped bass (*Morone saxatilis*), catfish (*Ictalurus sp.*), and river herring (*Alosa pseudoharengus*) were much more abundant before water quality declined. Pollution-sensitive species are present in large numbers, such as the cutlips minnow (*Exoglossum maxilligua*) and tessellated darter (*Etheostoma olmstedii*) in Rock Creek Park. The fish species which contain the most toxins in their tissue are bottom feeders such as catfish, eel, and carp, suggesting that bottom sediments are the source of toxicity. Other factors that may be contributing to population declines may be barriers to passage of migratory species and overexploitation by anglers. However, there is evidence of some migratory populations being more abundant than semi-migratory populations. In Rock Creek Park, yellow and white perch populations, semi-migratory species, are reduced. Contrasting this, alewife and blueback herring which are migratory species, are not reduced. This may indicate the largest issue affecting fish populations is water quality.

Human/Wildlife Interactions

Recreation

Noncommercial fishing is a popular form of recreation in the District of Columbia. Fish consumption has become a public health concern, as many of the District’s fish contain harmful

chemicals. The most common chemicals are polychlorinated biphenyls (PCBs), and the most common toxic fish are catfish, carp, and eel. These fish tend to concentrate chemicals in their tissues, and in turn pass these chemicals to predators when consumed. Other chemicals that can accumulate in fish include pesticides, metals, dioxins, hydrocarbons, and other semi-volatile substances which are harbored by such fish species as large mouth bass and sunfish. Cooking does not remove these chemicals (and in fact may concentrate them), which can have health effects including cancer and other diseases in humans. In response, the Washington DC Department of Health issued a fishing advisory in 1994 that identified catfish, carp, and eel as harmful for consumption, and encouraged fishermen to catch and release these fish species only. (CDC, 1999).

With over 300 species of birds recorded within the District, bird watching is also a popular recreational activity. Popular birding areas include Great Falls National Park, National Arboretum, Kenilworth Aquatic Gardens, and Rock Creek Park (Audubon Society, 2005).

Diseases

Several diseases effecting humans in the District of Columbia are said to be epizootic - transmitted by wildlife vectors. Rabies in particular is a virus spread through the saliva of raccoons, foxes, and bats (CDC, 2003). One common misconception about rabies is that domestic animals are the most likely carriers of the disease. However, in 2001 the CDC (Centers for Disease Control and Prevention) found that 93% of cases in domesticated animals were contracted through interactions with raccoons. Therefore, in the District, raccoons are currently the most likely vector for the virus (CDC, 2003b). Although rabies is fatal if post-exposure treatment is not sought out, very few people die from exposure to the virus. This is due to management strategies from local health departments. The Animal Disease Prevention Division of the District of Columbia's Department of Health implements specific services that minimize exposure of rabid wildlife to humans. These activities include: investigations, follow-up calls on rabies cases, making recommendations for rabies prophylaxis, ordering quarantine for animal bites, performing humane intravenous euthanasia, performing inspections and recommending methods for exclusion, and providing education via pamphlets/classroom visits (DOH, 2005).

West Nile Encephalitis, another epizootic virus to be spread by wildlife in the District of Columbia, is transmitted by a mosquito virus, *Culex* Spp. Mosquitoes become infected when they first feed on birds, and later can spread the virus to humans through their saliva. As of 2003, West Nile virus had been detected in dead 128 dead bird species (CDC, 2003a). The spread of the virus geographically has been very rapid. In 2004, the virus was reported to be found throughout the continental United States, including the District of Columbia (CDC, 2003a). The Animal Disease Prevention Division of the District of Columbia's Department of Health runs management projects for West Nile that include disease surveillance and education. Within the District, the use of pesticides has not been a mosquito management tool for this disease (DOH, 2005).

Although Rabies and West Nile are the best known epizootic diseases in the District of Columbia, a myriad of lesser-known diseases are also spread by ticks. Tick diseases endemic to the District include Erlichiosis, Lyme Disease, and Rocky Mountain Spotted Fever (CDC, 2005).

Confrontation Between Wildlife and Pets

Within urban settings, pets and wildlife can interact causing the spread of disease and other health issues. One concern is transmission of rabies, since the pet can then pass the disease to humans. Other diseases pets are at risk to contract include lyme disease, canine distemper, and raccoon roundworm. Management of these diseases requires public education, rabies vaccinations, and the minimization of contact between raccoons and pets. Raccoons are a particular threat to domesticated animals since they will often have home-ranges that include the same habitats pets frequent such as high and moderate residential areas. Not only are raccoons the most likely carrier of rabies, but 40-60% of raccoons have roundworm. Therefore raccoons tend to be the most dangerous wildlife to pets (VFWD, 2004). The District's Department of Health's current management strategy is to pick up dangerous and stray animals found within the District (DOH, 2005).

Besides diseases, pets must also face the possibility of wildlife attacks in the District. In the District, these attacks are almost exclusively done by foxes, as there are no larger predators. Dogs are almost never the victims, while cats are sometimes attacked. Other pets most vulnerable to fox attacks are rabbits, hamsters, and guinea pigs. These attacks are most likely to occur in moderate density residential areas at night, while the pet is not under supervision by the owner.

Car Accidents

Although urban motorists run less of a chance of hitting wildlife in the city than in suburban areas, there are still a substantial number of urban road collisions especially within park areas. In Rock Creek Park alone between 1991 and 2001, 1,088 squirrels, 455 raccoons, 303 deer, 135 opossums, three grey fox, 90 birds, 22 box turtles, and 15 black rat snakes were hit by cars (NPS, 2005).

Wildlife and Habitat Management Programs:

A variety of habitat management programs have recently been completed, are currently ongoing, or are planned for the future in the District. Many parks within the city have detailed habitat management plans that focus on creating and maintaining forested and native habitat areas. While the majority of these habitat management programs occur on parkland, other areas within the city are also implementing management programs. A sample of these projects and programs are listed in **Table 2.19**.

The Comprehensive Wildlife Conservation Strategy (CWCS) was developed in 2005 by the DC Fisheries and Wildlife Division in partnership with local wildlife agencies and organizations, as well as the public. The strategy is an action plan for conserving wildlife and their habitats over the next 10 years, and identifies conservation actions that target threats to the District's species in greatest conservation need as well as their habitats. The CWCS captures the best scientific expertise in the District, with local biologists and resource managers working in coordination with local and national conservation planners, along with guidance from District residents. The plan was completed in September 2005 and was approved with conditions by the US Fish and Wildlife Service in December 2005.

DC Fisheries and Wildlife is currently editing the document and expects to receive final approval by June 2006 (DOH k, 2006).

The Urban Forestry Administration (UFA) works to improve tree density and health, and manages approximately 135,000 street trees in the District. On average, 18,000 trees per year are pruned, 4,500 are planted, and about 2,500 are removed due to poor health or death. This year, with additional funding, the UFA will plant approximately 8,000 trees. Tree planting is done both to replace trees that have died, and to fill in areas that have been identified as suitable for planting. Trees will not be replanted in areas that are deemed unsuitable or in high risk areas such as those too close to driveways, in sites that will obstruct the view traffic, or in sites that are too close to fire hydrants. UFA is currently working to replace Norway (*Acer platanoides*) and silver maple (*Acer saccharinum*) with other tree species such as sugar maple (*Acer saccharum*) that have smaller chance of succumbing to blights and other diseases. In addition, UFA is planting smaller trees such as crape myrtle (*Lagerstroemia fauriei*), dogwood (*Cornus sp.*) and redbud (*Cercis Canadensis*), in the areas where electrical wires are located.

UFA administers the Tree Bill for the District of Columbia which states that removal of any healthy tree over 18 inch diameter at breast height requires payment into the Tree Fund or a replacement planting equal to that of the tree removed. The bill helps protect areas that are not in public space, but are an important part of the canopy cover for the District. The Urban Forestry division has also obtained a grant from WASA to replace trees to help with storm water retention and implement management techniques such as rain-gardens. The UFA also receives grant money from the US Forest Service to use and disseminate to community groups, non-profit groups, and other organizations that propose projects that support Urban Forestry. Money from the grant is used to train UFA staff and help with technology support for the urban forestry program. UFA reviews public space permits, construction drawings, and other projects that affect the urban forest within D.C, and also provides protection measures for existing trees and recommendations for green space enhancements (John Thomas, UFA personal communication, 2005).

Other organizations have also worked to address the decline of trees within the city. For example, the mission of Casey Trees Endowment Fund is to restore the tree cover of the District of Columbia. The Casey Trees Endowment Fund, in cooperation with neighborhood residents and community organizations, city government, federal agencies, and others has inventoried every street tree in the city, planted more than 2,700 trees and seedlings in projects throughout the city, held community meetings, and trained several hundred volunteers in the Citizen Forester program.

Many communities are working to reduce invasive species and increase native seed planting. The US Fish and Wildlife Service works with the Potomac Conservancy to host an annual volunteer seed collection effort within the Potomac Watershed. Over 5,000 volunteers have participated in this event to increase the amount of native trees within the watershed. Over the last 10 years, invasive plant management has been occurring within Rock Creek Park by both manually removing non-native invasive plant species and using herbicides. Also, Rock Creek Park and the U.S. National Arboretum have implemented integrated pest management (IPM)

plans to control and prevent pests using several methods along with pesticides and herbicides to minimize environmental impacts.

Species such as deer, voles, and beaver can negatively affect vegetation cover by damaging or destroying young trees and grazing on young vegetation. Several management options for these nuisance species are currently being considered both within the Anacostia watershed and within Rock Creek Park. Management options proposed for deterring white tail deer within the Anacostia Watershed include physical exclusion, repellants, scare devices, planting palatable plants, reducing the population through non-lethal and lethal methods, and trapping and relocation (Metropolitan Council of Governments, 2005).

Management plans within the District have not only targeted improving terrestrial species habitats, they have also focused on improving aquatic habitats. Collaborative efforts between the National Park Service, Federal Highway Administration, the Virginia Department of Transportation, the District of Columbia, and the Smithsonian National Zoological Park have resulted in the implementation of a broad scale stream restoration project. Since December 2004, construction has been in progress removing or modifying over 23 fish barriers in streams feeding the Potomac River. Removal of these barriers will help migratory fish such as the American shad and the river herring reach their breeding grounds and help restore populations of these species within the District (NPS(c), 2005). In addition, the Interstate Commission on the Potomac River Basin along with various partners instituted an American Shad restoration project which has stocked over 15.8 million shad fry in the Potomac River over the last eight years.

Other management plans that affect water quality include stormwater management plans which have been designed and implemented in areas of the city to reduce the impact on pollutants on the aquatic community. For example, in the Washington Navy Yard, bioretention cells were constructed to reduce runoff volume and provide pollutant filtering functions (Chesapeake Bay Program, 2003).

Several watershed protection projects not only benefit the aquatic community, but also create habitat for terrestrial species as well. In 1997, the District of Columbia signed the Chesapeake Bay Agreement which calls for “no net loss” and the restoration of wetlands (DC 303(d), 305 (b) list, 2004). Under this agreement, the Environmental Health Administration’s Watershed Protection Department restored over 33 acres of emergent marsh in Kenilworth Aquatic Gardens, as well as 42 acres of emergent marsh and 15 acres of river fringe wetlands in Kingman Lake. These restored wetland areas create new habitat for a variety of species. A breeding bird census taken within the marsh area noted the return of red winged blackbird (*Agelaius phoeniceus*), common yellowthroat (*Geothlypis trichas*), and tree swallow (*Tachycineta bicolor*) populations. Until the completion of this marsh restoration project, a migratory bird species, the long-billed wren (*Thryothorus longirostris*) had not been seen within the District for more than 30 years (NPS (d), 2005). Within the lower section of Anacostia Park there have been additional habitat enhancements. For example, along Popes Branch, Watts Branch, Hickey Run, Oxon Run and on Heritage Island a variety of native planting programs, stream stabilization programs, wetland restoration projects, and stream daylighting projects have been implemented with funding from the US Army Corps of Engineers (USACE) (DC 303(d), 205 (b) list, 2004).

Table 2.19 Management Projects within the District of Columbia			
Agency	Project Title	Facility	Site
USN	Storm Water Pollution Prevention Plan (SWPPP)	Anacostia Annex	Anacostia, Washington DC
USN	NPDES Permit and associated Water Quality Monitoring	Anacostia Annex	Anacostia, Washington DC
USN	Upgrade of Aboveground Storage Tanks (ASTs)	Anacostia Annex	Anacostia, Washington DC
USN	Low Impact Development	Anacostia Annex	Anacostia, Washington DC
USN	Storm Water Pollution Prevention Plan (SWPPP) - Revision	Washington Navy Yard	Washington DC, SE
USN	RCRA Facility Investigation	Washington Navy Yard	Washington DC, SE
USN	NPDES Permit and associated Water Quality Monitoring	Washington Navy Yard	Washington DC, SE
USN	Illicit Discharge Survey Update	Washington Navy Yard	Washington DC, SE
USN	Upgrade of Aboveground Storage Tanks (ASTs)	Washington Navy Yard	Washington DC, SE
USN	Storm Sewer Rehabilitation Project	Washington Navy Yard	Washington DC, SE
USN	Low Impact Development	Washington Navy Yard	Washington DC, SE
USN	Bioretention cells	Washington Navy Yard	Washington DC, SE
USN	Permeable Pavers	Washington Navy Yard	Washington DC, SE
USACE	Lower Kingman Island Section 1135	n/a	Lower Kingman Island near RFK Stadium, DC
USACE	Lower Anacostia Park Stream Restoration	n/a	Pope Branch, Lower Anacostia Park
USGS	Monitor Progress of Kingman Marsh Restoration - Vegetation and Soils	n/a	Kingman Marsh
USACE	Anacostia Watershed Restoration Phase 1	n/a	Montgomery County, District of Columbia
USACE	Northwest Branch Stream Restoration, Section 206	n/a	Northwest Branch
USGS	Monitoring Benthic Organisms	n/a	Kingman/Kenilworth Marshes
USGS	Avi-fauna monitoring at Reconstructed Sites in the Tidal Anacostia	n/a	Kingman and Kenilworth Marshes
USACE	Fort Dupont and Fort Chaplin Creek Restoration	n/a	Fort Dupont and Fort Chaplin Creeks
USACE	Heritage Island Restoration	n/a	Heritage Island in Kingman Lake
USFWS	Tumors and biomarkers of exposure in brown bullheads from the Anacostia River, Washington, DC and Tuckahoe River, Maryland		Tidal Anacostia River, Washington, DC
USFWS	Using the sediment quality triad to characterize baseline conditions in the Anacostia River, Washington, DC		Tidal Anacostia River
USFWS	Seasonal movement patterns, home ranges, and habitat use of the brown bullhead in the Anacostia River		Tidal Anacostia River

FINAL DRAFT Environmental Baseline Report

The Louis Berger Group

Table 2.19 Management Projects within the District of Columbia

Agency	Project Title	Facility	Site
USFWS	Contaminant Monitoring in the Kingman Lake Restored Wetland		Kingman Lake
USFWS	Larval fish toxicity studies in the Anacostia River		Anacostia R. from Bladensburg to mouth
USFWS	Assessing the bioavailability of organic contaminants in the Anacostia River using semi-permeable membrane devices and filter-feeding clams		Anacostia R. from NE and NW Branch to river mouth
NPS	Design and Construction of Installation of Sewer Line at Kenilworth Maintenance Facility	Kenilworth Maintenance Facility	Anacostia Park
NPS	Kenilworth Marsh Interpretive Boardwalk ("Additive A")	Kenilworth Aquatic Gardens	Anacostia Park
NPS	Anacostia Park General Management Plan (GMP)	National Capital Parks-East	Anacostia Park
USACE	Kingman and Heritage Islands Habitat and Passive Recreation Study	n/a	Kingman and Heritage Islands
USEPA	Approval of DC Water and Sewer Authority (DCWASA) Long Term Control Plan		All District of Columbia pervious areas
USEPA	Chesapeake Bay Urban Stormwater Initiative	Watershed-wide federal facilities	Watershed-wide
USEPA	Potomac-Anacostia River Flagging Project	none	Anacostia River
GSA	Bioretention Cell	National Building Museum (Pension Building)	Southeast Parking Lot
GSA	Bioretention Strip (Low Impact Development Feature)	Southeast Federal Center	Anacostia River frontage
GSA	Sustainable Design Program	NA	National Capital Region
GSA	Environmentally Beneficial Landscaping Program	NA	National Capital Region
GSA	Stormwater Management Plan	NA	National Capital Region
USFWS	Hickey Run Stream Assessment	National Arboretum & upper watershed	Hickey Run
USFWS	Watts Branch Stream Assessment	Kenilworth Park	Watts Branch
USN	Tree box	Washington Navy Yard	Washington DC, SE
USN	Rain garden	Washington Navy Yard	Washington DC, SE
USN	Sand Filters	Washington Navy Yard	Washington DC, SE
USN	LID Maintenance	Washington Navy Yard	Washington DC, SE
USN	Storm Drain Maintenance	Washington Navy Yard	Washington DC, SE
USN	Sand Filter Maintenance	Washington Navy Yard	Washington DC, SE
USFS	Riparian Forest Buffer Planting	Various	Watershed-wide
USFS	Urban Forestry Technical Assistance	Any	Watershed-wide
USFS	Growing Native Seed Collection	Public Parks and	Watershed-wide

Table 2.19 Management Projects within the District of Columbia

Agency	Project Title	Facility	Site
		Facilities and Private lands	
USFS	Potomac Watershed Partnership	Various	Watershed-wide
USA	Riparian Buffer Zone creation at various locations at Fort Myer	Fort Myer	five stormwater outfalls
USGS	Hydrogeology and Ground-Water Quality of the Anacostia River Watershed, Washington, D.C.	n/a	Lower tidal Anacostia River
USGS	Discrete and Continuous Water-Quality Monitoring for Nutrients, Sediment, Metals, Bacteria, and Organics, Anacostia Watershed, Maryland	n/a	Riverdale and Hyattsville
USEPA	A Toxics Management Strategy for the Anacostia River	All	River and tributaries

Source: Chesapeake Bay Program, 2005

2.4.3 TRENDS

Biotic communities have both declined and changed over the past century as the District has become more urbanized and fragmented. Habitat has been lost and altered due to an increase in developed areas and a decrease in forest cover. Invasive species populations have increased. Some of these trends may reverse with time, particularly on a local scale, as implementation of conservation projects and programs continue.

The effects of habitat loss is observable through the decrease in several wildlife populations. Although data is not available for all wildlife species within the District, DOH has noted that populations of the following species are potentially declining: American bittern, Virginia possum, bog turtle, and American eel. Both American bitterns and Bog turtles require pristine wetland habitats which are a small proportion of the District. Virginia opossums require wooded habitats which are decreasing while the numbers of their largest threats, cars and domesticated pets, increase (DOH k, 2006). In addition, migratory bird species populations within the city may begin to decrease if open space is not protected. Conservation actions that may help restore these populations include wetland and forest habitat restoration and protection, removal of invasive plants, and deer management to protect and restore the plant diversity many wildlife species require.

The status of the aquatic habitats within the District has declined due to pollutants and disturbance. Stream health continues to decline due the decrease in forest cover and presence of point and non-point source pollutants. Populations of the American eel, found in the Potomac River, Anacostia River, and Rock Creek, may be declining due to overharvest and lack of quality habitat (DOH k, 2006). Although both the alewife and blueback herring populations within the District are considered to be stable, the populations of both of these species is low due to a lack of quality spawning and juvenile habitat.

Although some fish populations may be continuing to decline, recent conservation actions may help to improve aquatic habitats. Information collected by DOH shows that migratory american shad and hickory shad populations are rebounding from historically low levels (DOH k, 2006).

The continual recovery of these species may be due to ongoing conservation actions such as fish barrier removal, stream restoration, and stock enhancement.

2.5 ENVIRONMENTAL HAZARDS

2.5.1 REGULATORY FRAMEWORK

Within the District of Columbia, many environmental programs are assigned to the District's Department of Health. Contained within the Department of Health's is the Environmental Health Administration. Its mission is to prevent and control environmentally related diseases while protecting and preserving the ecological system in the District of Columbia (DOH, 2005c). The Bureau of Hazardous Material and Toxic Substances and the Bureau of Environmental Quality address many of issues that arise from the presence of environmental hazards. The Bureau of Hazardous Material and Toxic Substances have six different divisions responsible for protecting the health of the public and of the environment:

- Underground Storage Tanks Management Division, which is comprised of two programs, one focusing on the regulation of underground storage tanks and the other focusing on the corrective action for leaking underground storage tanks and the cleanup of contaminated sites
- Pesticide Regulation Program
- Lead-Based Paint Management Program
- Hazardous Waste Division
- Voluntary Cleanup Program
- Radiation Protection.

In the Bureau of Environmental Quality, the Air Quality Division responds to toxic releases, asbestos, radon, and indoor air contaminants; while the Water Quality Division responds to spills and releases into surface water, as well as contamination of groundwater.

Together, these bureaus are responsible for preventing the contamination of the District's resources, managing hazardous waste originating from within the city, requiring the cleanup of contaminated sites and encouraging the voluntary cleanup of brownfield sites, and increasing public's awareness of the dangers associated with lead and other environmental hazards.

Underground Storage Tanks Management Division

In 1997, the District of Columbia was granted state program approval by the EPA to manage and monitor all underground storage tanks (UST) and leaking underground storage tanks (LUST) located within the city (EPA, December 2005d). The mission of the Underground Storage Tanks Management Division is to protect human health and the environment from the adverse effects of petroleum, petroleum-related products, and hazardous materials through:

- Prevention of releases from underground storage tanks (USTs)

- Inspection, investigation, remediation, monitoring, voluntary cleanup, and risk assessment programs to ensure compliance
- Strong enforcement of District and federal regulations

The division is divided into two programs:

- **UST Program:** Directs the regulatory requirements intended to prevent releases. Activities include regulation of installation, removal, abandonment, upgrades, and leak detection systems, and full compliance inspections and enforcement actions (DOH, December 2005d).
- **LUST Program:** Directs the regulatory requirements intended to deal with releases, i.e., contaminated sites. Activities include release reporting, initial response and abatement activities, investigations of confirmed releases, review of site assessment reports, risk-based corrective actions, and both voluntary and mandatory cleanup report review and approval (DOH, December 2005d).

The provisions of the District's underground storage regulations can be found in Title 20, Chapters 55-70 of the District of Columbia Municipal Regulations (DCMR).

DC Official Code § 8-113 provides definitions and authorizations that empower the division to carry out its mission. In addition, Subtitle I of the Resource Conservation and Recovery Act (RCRA) allows approved state programs to operate in lieu of the federal program. EPA's state program regulations set the standards for the approval of state programs.

Toxic Substances Division (Pesticide Regulation Program)

The Toxic Substances Division regulates the sale, distribution, storage, use, and disposal of pesticides in the District of Columbia as outlined in DCMR, Title 20 Chapters 22-25 (DOH, 2005e). The term "pesticides" refers to fungicides, insecticides, rodenticides, herbicides, and antimicrobials. DC Code §§ 8-401 to 8-419 provides the legislative framework that authorizes the division to carry out its mission. Its mission is to ensure protection of human health and the environment from risks resulting from pesticides, while recognizing the benefits that pesticides offer to society. Further, the Pesticide Program seeks to prevent pollution; protect human health, the land, air, water, and both plant and animal non-target species; and show positive human health or environmental results within the community (DOH, 2005e). This is done through a certification and testing program that ensures that governmental and commercial applicators of pesticides within the District of Columbia know how to properly apply the correct pesticide and in the correct dosage. In addition, the division also maintains a registration of all pesticides sold to governmental and commercial applicators throughout the District of Columbia, and monitors for compliance by conducting spot checks and investigations of pesticide application (DOH, 2005e). This program also provides public outreach and education relating to the safe use of pesticides, as well as Integrated Pest Management techniques, such as exclusion and the use of the least toxic pesticidal products appropriate to the application.

Lead-Based Paint Management Program

The District of Columbia Government conducts lead poisoning prevention activities through a number of agencies, including the Department of Health, with its Childhood Lead Poisoning Prevention, Screening, and Education Program; Medicaid Managed Care Program; and Childcare and Residential Facilities Licensing and Regulation Program. In addition, the Environmental Health Administration has a Lead-Based Paint Management Program, described below, which regulates the training and certification of abatement professionals and workers and establishes safe work practices. The Department of Consumer and Regulatory Affairs is responsible for enforcement of the District's Housing Regulations, which require that all housing where children under the age of eight reside or could reasonably be expected to reside or visit on a regular basis, be maintained free of lead-based paint hazards, including paint hazards, dust hazards, and soil hazards. The Department of Housing and Community Development provides grants to homeowners and owners of multi-family dwellings for lead hazard control. The District of Columbia Housing Authority is tasked with lead hazard control for public housing. In addition, the Child and Family Services Agency requires that all foster and adoptive homes be certified as lead safe. The District of Columbia Water and Sewer Authority has embarked upon an ambitious lead pipe replacement program to eliminate the risks associated with lead in drinking water. Over the years, concerned government officials and children's health advocates have established a number of task forces and advisory groups to address various lead issues. The Mayor's Office is presently working on re-convening a multi-agency task force to ensure coordination of the various lead programs and activities.

The Lead-Based Paint Management Program is an authorized EPA state program funded by the Lead-Based Paint Compliance and Enforcement Grant (DOH, 2005g), program revenues, intra-district transfers, and local dollars. The mission of this program is to protect human health and the environment from the adverse effects of lead-based paint through implementation of a District-wide strategy to build the infrastructure necessary to reduce the hazards of lead-based paint poisoning.

Activities aimed at reducing exposure to lead hazards include:

- Accrediting training providers and courses;
- Certifying abatement contractors, professionals, and workers;
- Establishing work practice standards for abatement;
- Permitting abatement projects;
- Inspections and enforcement of the accreditation, certification, permitting, and work practice standards;
- Public outreach and education;
- Providing inspection services and technical assistance to other District agencies, including the Childhood Lead Poisoning Prevention, Education, and Screening Program; the Child and Family Services Agency; the Department of Housing and Community Development; and the Department of Consumer and Regulatory Affairs.

Hazardous Waste Division

The Hazardous Waste Division was formed as a result of the District's reorganization of the Department of Consumer and Regulatory Affairs. After 1996, all environmental programs were

reassigned to the Department of Health and hazardous waste management was assigned to the Hazardous Waste Division (EPA, September 2001). The Division performs two separate activities; the first involves the regulation of hazardous waste pursuant to Subtitle C of the federal Resource Conservation and Recovery Act; and the second provides regulatory oversight and technical review for contaminated site investigation and remediation at active and formerly used defense sites. The Subtitle C program regulates hazardous waste from “cradle-to-grave”, and also includes a used oil program. In addition to inspections and enforcement, staff collect data relating to the generation, handling, and disposal of hazardous waste and used oil; and engage in activities to encourage toxic chemical source reduction and hazardous waste minimization.

The contaminated site program receives funding from the Army, Navy, and Air Force to provide technical review of their various site investigation and remediation activities. Staff closely monitor the cleanup of arsenic-contaminated soils and chemical and other munitions in Spring Valley, as well as the groundwater study that is presently underway. Staff are also engaged with the review of cleanup activities at the Washington Navy Yard, the District’s only Superfund Site, and Bolling Air Force Base.

Radiation Protection Program

The purpose of the Radiation Protection Division is to protect the public from the hazards associated with radiation. With the exception of source, special nuclear, and byproduct material, the regulation of which is preempted by the Federal Government, the Radiation Protection Division regulates all other sources of radiation, including X-Ray machines, particle accelerators, radioactive material created by accelerators, lasers, cell phone towers, and low-level radioactive waste. The Division is also responsible for conducting various emergency planning, preparedness, and response activities under the District’s Bioterrorism Grant related to radiation, hazardous substances, and infectious agents. The Division:

- Develops and implements regulations, standards, and guidance relating to radiation protection;
- Issues biennial registration certificates to over 2000 users of sources of radiation;
- Reviews and determines the adequacy of health physics shielding plans for facilities housing radiation producing materials and devices;
- Conducts routine compliance inspections of all facilities that use radioactive material, x-ray producing equipment, and lasers, including hospitals, clinics, private practitioners offices, and cell phone towers;
- Conducts special inspections of mammography facilities pursuant to an agreement with the United States Food and Drug Administration;
- Conducts radiation surveys of all Radio-Frequency (RF) producing structures;
- Maintains surveillance over all shipments of low-level radioactive waste in and through the District;
- Participates in multi-media environmental review of matters involving contaminated sites where radioactive materials are a contaminant of concern, as well as matters subject to the District’s Environmental Policy Act and similar environmental review processes, where radiation is a matter of concern;
- Performs surveillance and monitoring activities to determine radiation contamination;

- Investigates radiation incidents;
- Responds, in coordination with the Department of Fire and Emergency Medical Services, to radiation emergencies;
- Conducts emergency planning, preparedness, and support for incidents involving radiation, hazardous substances, and infectious agents; and
- Conducts public outreach and education relating to radiation safety, mammography, and nuclear medicine.

Voluntary Cleanup Program

One of the goals of the Environmental Health Administration is to protect and preserve the ecological system of the District, protect and increase green spaces, and promote the safe use or development of lands that are contaminated or perceived to be contaminated by hazardous substances. To achieve this goal, the Environmental Health Administration established the Voluntary Cleanup Program. The Voluntary Cleanup Program's mission is to:

- improve human health and the environment
- promote urban redevelopment
- and stimulate economic growth by encouraging and supporting the reuse of contaminated lands and buildings through voluntary, private cleanup.

This program oversees owner or developer initiated voluntary remediation of contaminated lands and buildings that return actual or potentially contaminated properties to productive uses. The District of Columbia has several sites currently involved the Voluntary Cleanup Program (EPA, February 2005). These include:

- Camp Simms Residential & Commercial, Alabama Avenue and 15th Street, SE- This site was formerly the Camp Simms National Guard facility used as a target range facility, ammunitions dump, and defensive battery. The site is currently owned by the District of Columbia Department of Housing and Community Services and will be redeveloped for commercial and residential use. Presently, polycyclic aromatic hydrocarbons and semi-volatile compounds are found on the site.
- 1755-1759 Columbia Rd. NW- Currently the site of retail & restaurant establishments, this site was purchased by Combined Properties, Inc. in 2004 and is scheduled to be converted into mixed use development. Total petroleum hydrocarbon (tph), polycyclic aromatic hydrocarbon (pcah), chlorinated and non-chlorinated hydrocarbons are found on the site.
- 100 I St SE- An 82,000-sq-ft old trash transfer lot where volatile compounds and chlorinated solvent compounds in soil and groundwater have been found.
- 27th Block C St SE / American Pharmaceutical Society Annex- volatile compounds and chlorinated solvent compounds in soil and groundwater

- Fort Totten Park Apartments Near Ft. Totten metro- volatile organic compounds, metals, arsenic, & lead exceeding District regulatory guidance

The EPA has played a significant role in helping the District establish the Voluntary Cleanup Program. In 1999, the Department of Health entered into an agreement with the EPA, Region III to establish a Clean Lands Program in the District of Columbia (DOH, 2005i). The purpose of the Clean Lands Program is to ensure that any potential or known contaminated land in the city is carefully and efficiently assessed, cleaned to the city's groundwater and soil standards, and then reused for development or other productive uses.

In June 15, 2001, the Brownfield Revitalization Amendment Act of 2000 (DC Official Code § 8-631) established the Voluntary Cleanup Program for contaminated property. The Act authorized tax and other incentives for clean up and development of contaminated properties, and amended provisions of other acts to incorporate and support the cleanup and redevelopment of contaminated sites.

In 1998, the EPA had selected the District of Columbia to be a Brownfields Assessment Demonstration Pilot under its Brownfields Economic Redevelopment Initiative and gave a grant of \$200,000 to the city to be used to assist in cleanup and redevelopment (EPA, July 1998). In 2001, the EPA had granted supplemental assistance in the form of \$100,000 to District of Columbia to continue the work of identifying, evaluating, prioritizing, and assessing brownfields (EPA, April 2001).

2.5.2 CHARACTERIZATION

Brownfields

DC Code § 8-633.02 defines a brownfield as an “abandoned, idled property or industrial property where expansion or redevelopment is complicated by actual or perceived environmental contamination.” In District, the VCP is responsible for overseeing cleanup plans and efforts on private property, unless the contamination results from leaking underground storage tanks; maintaining a database of clean properties; and investigating contamination at possible brownfields.

The District currently has several sites participating in the Voluntary Cleanup Program. From the EPA's Brownfields Management System (BMS), seven properties had been identified as brownfields (EPA, December 2005a). The BMS is the EPA's database for the Brownfields Program. The database assists the EPA in collecting, tracking, and updating information, as well as reporting on the major activities and accomplishments of the various Brownfields grant programs. Further details about the site, such as the type of contaminant and dates, were unavailable at the time of access. **Table 2.20** shows the property and status of the site accessed from the BMS.

Table 2.20: Brownfield Sites in the District of Columbia from the BMS Database

Property Name	Address	Total	Status of Site	Media Affected
5th and K Streets	Washington DC	3.2	Assessed	-
Brentwood Road	1100 Brentwood Road, NE	14.5	Ready for Reuse	Soils
Georgia at Upshur St.	Washington DC	1.6	Assessed	Soils
Kingman Island	Washington DC	45	-	Soils, Groundwater
Pepco Pumphouse	Washington DC	1	Ready for Reuse	-
Square 710	119 New York and 151 O Street, NE	7	-	Soils, Groundwater
Washington Gas	12th and M Streets, SE	11	Ready for Reuse	-

UST/LUST

According to the Office of Underground Storage Tanks (OUST) of the EPA, as of September 30, 2004, there were 720 active underground storage tanks in the District of Columbia (OUST, 2004). There were 788 confirmed releases and 545 cleanups completed. The backlog of cleanups to complete was 243 sites. For comparison, states such as Massachusetts have 11,368 active USTs, 6,103 confirmed releases and 5,026 cleanups completed. New York has 29,925 active USTs, 20,422 confirmed releases, and 18,442 cleanups completed. New York City has at least 1,600 underground storage tanks in at least 400 locations throughout the New York City metropolitan area. The District is most comparable to Delaware, with 598 active USTs, 2,284 confirmed releases, and 2010 cleanups completed (EPA, September 2005h). **Table 2.21** is a summary of GIS data provided by the Office of the Chief Technology Officer (OCTO) concerning the number of USTs, LUSTs, and ASTs in the District of Columbia by planning area.

Table 2.21: Counts of Storage Tanks by Planning Area

Planning Area Name	LUST	UST	AST
Upper Northwest			
West	159	149	54
Upper Northwest			
North	110	101	4
Mid-City	141	117	11
Near Northwest	184	153	16
Central Washington	261	154	93
Upper Northeast	229	194	15
Capitol Hill	49	46	7
Anacostia Waterfront	125	98	36
Anacostia/ Upper			
Southeast	153	71	28
East Washington	121	93	2
Total	1532	1176	266

CERCLIS Sites

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to

respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment (EPA, December 2005f).

The Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) is a compilation of records from a nationwide database created to maintain and regulate those facilities or sites that the EPA has investigated or will investigate for suspected or uncontrolled releases of hazardous substances, contaminants, or pollutants as reported by states, municipalities, private companies, and private citizens under CERCLA (or the Superfund Program) (EPA, December 2005e). Once a site is placed on the CERCLIS list, it may be subjected to several additional levels of evaluation to determine the severity of the contamination, from discovery and preliminary assessment to site inspection, and possibly the application of the Hazard Ranking System (HRS).

Such a determination could ultimately place the site under consideration for inclusion on the National Priorities List (NPL). The NPL is a federal listing of uncontrolled or abandoned hazardous waste sites that pose a potential risk to human health or the environment (EPA, December 2005f). The list is created from the CERCLIS database and is primarily based upon a score that each site or facility receives from the HRS. After a site or facility has been identified as a CERCLIS site, the EPA conducts an assessment of the property. The HRS score associated with the degree of environmental risk found is one of the determinations made as to whether the site is placed on the NPL. These sites are then prioritized for possible long-term remedial action and referred to the state for further action under state programs

The CERCLIS data base lists 32 sites in Washington, D.C (December, 2005e). When a hazardous site is found, the information about the site is entered into CERCLIS. Sites listed in CERCLIS are investigated to determine what further actions (if required) are necessary to protect human health and the environment. Inclusion on the CERCLIS list does not confirm the presence of an environmental problem or a public health threat. The Washington Navy Yard was the only site to be listed on the National Priorities List (NPL). It should be noted that when a site is put into CERCLIS, it will remain in the data base even after all actions have been taken. Therefore, many of the sites listed have no ongoing activities.

Of the 32 sites listed in the CERCLIS data base, 13 are federal facilities. **Table 2.22** and **Figure 2.11** shows the information concerning the substances and media contaminated for 4 of the 32 sites: the Washington Navy Yard, the Washington Gas Light Site, the Washington DC Mercury Incident, and the USAF Bolling Air Force Base. Information concerning the contamination and media affected was not obtained from the CERCLIS database for the other 28 other sites.

Table 2.22 Sites and Contaminants

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EPA ID	Site Name	Fed Fac.	NPL	Non NPL Status	Media	Contaminants
DCN000306144	2005 Inaugural Pre-Deployment	N	N	R		not listed
DCSFN0305431	50th And Hayes	N	N	NF		not listed
DCN000305703	Capitol Hill Anthrax Site	N	N	R		not listed
DCN000306094	Capitol Hill Ricin Site	N	N	R		not listed
DCN000306151	Cardozo High School Mercury	N	N	R		not listed
DCN000305870	Custis & Brown Barge Spill	N	N	R		not listed
DCN000305659	DC Deicer Spill	N	N	NF		not listed
DCN000305729	Department Of Commerce Mail	Y	N	R		not listed
DCN000305704	Diamond Ordnance Fuze Lab	N	N	OF		not listed
DCN000305710	EPA Mail Rooms	Y	N	R		not listed
DC9470090003	Fort Lincoln Barrel Site	Y	R	unknown		not listed
DC8210021004	Fort McNair	Y	N	OF		not listed
DCN000305916	General Services Administration	Y	N	OF		not listed
DCSFN0305524	Glover Bridge Site	N	N	PA		not listed
DCN000305625	Hud Pcb Spill	N	N	PA		not listed
DCSFN0305462	Kenilworth Park Landfill Site	N	N	OF		not listed
DCD003254273	NPS - Anacostia Park Sections E	Y	N	OF		not listed
DCD983967951	Pepco Benning Road Facility	N	N	SI		not listed
DCN000305662	Poplar Point Nursery	N	N	OF		not listed
DC0001401637	Seafarers Yacht Club Er	N	N	NF		not listed
DC8470090004	Southeast Federal Center (Gsa)	Y	N	HRS		not listed
DC9751305997	St Elizabeth's Hospital	N	N	OP		not listed
DCN000305732	US Postal Service - Brentwood	N	N	R		not listed
DC5570024443	USAF Bolling Air Force Base	Y	N	OF	Soils	Aroclor 1260, Benzo [A] Pyrene
DC7120507432	USDA National Arboretum	Y	N	NF		not listed
DC1170023476	USN Naval Security Station	Y	N	OF		not listed
DCN000305585	Vermiculite Vpc1	N	N	NF		not listed
DC4210021156	Walter Reed Army Medical	Y	N	OF		not listed
DCD983971136	Washington D.C. Chemical Munitions Site (Spring Valley)	Y	N	OF		not listed
DCN000306000	Washington DC Mercury Incident	N	N	R	Soils	Mercury

Table 2.22 Sites and Contaminants

EPA ID	Site Name	Fed Fac.	NPL	Non NPL Status	Media	Contaminants
DCD077797793	Washington Gas Light Site	N	N	OP	Liquid Waste	Arsenic, Benzene , Benzo (B) Fluoranthene, Benzo (K) Fluoranthene, Benzo [A] Anthracene, Benzo [A] Pyrene, Benzene, Beryllium, Bis (2- ethylhexyl) Phthalate, Chrysene, Dibenzo (A,H) Anthracene, Indeno (1,2,3-CD) Pyrene, Manganese
DC9170024310	Washington Navy Yard	Y	F	SI	Soils	Metals, PCB, VOCs
<p>NPL Code- Status on the Superfund's National</p> <p>F= Currently on the Final NPL</p> <p>N= Not on the NPL</p> <p>R= Removed from Proposed NPL</p>						
<p>Non NPL Status</p> <p>R= Removal Only Site (No Site Assessment Work Needed)- These sites have been removed from the CERCLIS list and are no longer considered a federal concern</p> <p>NF- No Further Remedial Action Proposed</p> <p>OF= Other Cleanup Activity: Federal Facility-Lead Cleanup</p> <p>OP= Other Cleanup Activity: Private Party-Lead Cleanup</p> <p>PA= Preliminary assessment is still being performed to gather information about the site and its surrounding area</p> <p>SI= Site investigation is still being conducted</p> <p>HRS= Site is still being evaluated on the Hazard Ranking System</p>						

Hazardous Waste Sites in the District of Columbia

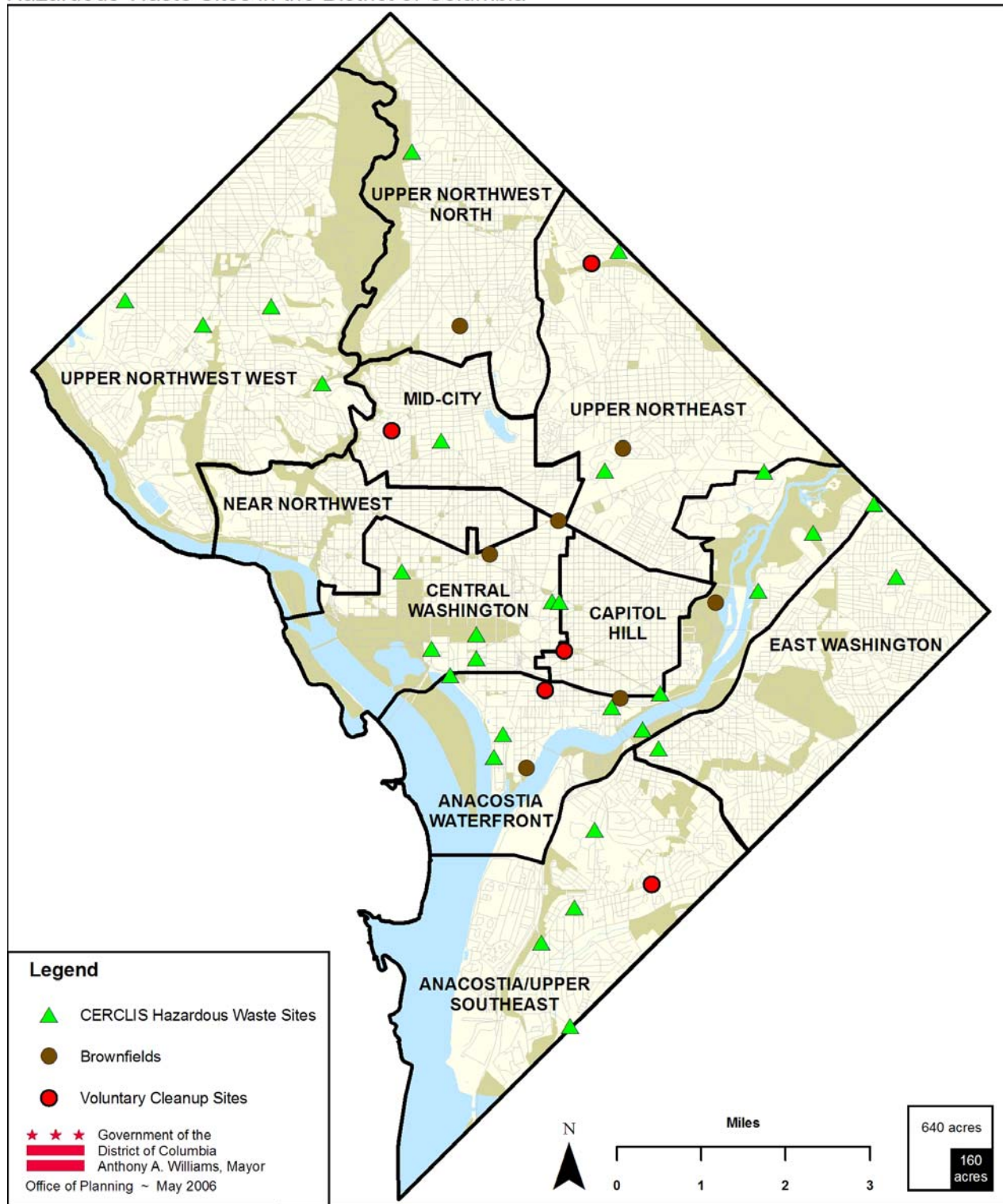


Figure 2-11: Hazardous Waste Sites in DC

RCRA Inventories

The Resource Conservation and Recovery Act (RCRA) was enacted by Congress in 1976. The primary goals of RCRA are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner (EPA, 2003). RCRA regulates the management of solid waste, hazardous waste, and underground storage tanks holding petroleum products or certain chemicals. Congress, through RCRA 3002(a)(6), requires the EPA to develop a program for hazardous waste generators to report the nature, quantities, and disposition of hazardous waste generated. The Biennial Report compiles data collected from large quantity generators about the generation, management, and final disposition of RCRA hazardous waste in the United States (EPA, 2003).

Based on the National Biennial Hazardous Waste Report (2003), the District of Columbia has 21 hazardous waste generators producing about 1,124 tons of waste. Of the 56 states and territories in the report, the District of Columbia ranked 54th in the quantity of hazardous waste produced and 49th in the number of generators. The District, however, also has about 600 small quantity and conditionally exempt small quantity generators. These generators combined produce more hazardous waste on a biennial basis than the large quantity generators combined. The District's Hazardous Waste Division therefore has initiated a self-certification and return-to-compliance program for small quantity and conditionally-exempt small quantity generators, to collect data from the regulated community regarding waste management practices and to provide information and assistance in toxic chemical source reduction, waste minimization, and emergency planning and preparedness.

Table 2.23 shows the 21 generators ranked by the amount of hazardous waste produced. All 21 generators were reported to be large quantity generators (LQGs) (EPA, 2003). A generator is defined as a LQG if it generated 1,000 kg (2,200 pounds) or more of RCRA hazardous waste in any single month; or accumulated 1 kg (2.2 pounds) of RCRA acute hazardous waste at any time; or accumulated more than 100 kg (220 pounds) of spill cleanup material contaminated with RCRA acute hazardous waste at any time.

Table 2.23: RCRA Hazardous Waste Generators in the District of Columbia (2003)			
Rank	EPA ID	Site Name	Total Generated
1	DCD00819516	PEPCO Benning Road Generating Station	373
2	DC2200907812	US Bureau of Engraving and Printing	320
3	DCD980204879	Catholic University of America	260
4	DC470090010	Smithsonian Institution - AA/PG BLDG	31
5	DCD077797793	Washington Gas East Station	27
6	DC8170024311	Naval Research Laboratory	20
7	DCD049515844	Georgetown University	14
8	DCD003259439	Gallaudet University	14

Table 2.23: RCRA Hazardous Waste Generators in the District of Columbia (2003)

Rank	EPA ID	Site Name	Total Generated
10	DC4210021156	Walter Reed Army Medical Center	13
11	DC4170000901	HQ NDW Naval Station Anacostia	7
12	DC7470090005	Smithsonian Inst - Natural History BLDG	5
13	DCR000500199	MEDSTAR Georgetown Medical Center	4
14	DC9170024310	HQ Naval District Washington	4
15	DCD000819508	PEPCO Buzzard Point Generating Station	4
16	DCD077795060	American University	4
17	DCD98190083	George Washington University	3
18	DC8470000086	Food and Drug Administration FB 8	3
19	DC4470090008	Smithsonian Institution - Mus of American History	2
20	DC7360010402	Dept of Veterans Affairs Medical Center	2
21	DCD074845504	Children's National Medical Center	1
Total			1,124

The EPA uses the North American Industry Classification System (NAICS) to categorize the activities associated with the generators. **Table 2.24** shows the top activities associated with hazardous waste generation. Most of the waste generated were associated with electric power generation, transmission, and distribution; printing and related support activities; and colleges, universities, and professional schools.

Table 2.24: Top Ten Quantities of Waste Generated in 2003, by NAICS Codes

Rank	NAICS	Description	Tons Generated
1	2211	Electric Power Generation, Transmission and Distribution	377
2	3231	Printing and Related Support Activities	320
3	6113	Colleges, Universities, and Professional Schools	295
4	7121	Museums, Historical Sites, Similar Institutions	39
5	2212	Natural Gas Distribution	27
6	9281	National Security and International Affairs	20
7	6221	General Medical and Surgical Hospitals	20
8	5417	Scientific Research and Development Services	20
9	9211	Executive, Legislative, and Other General Government Support	4
10	9221	Justice, Public Order, and Safety Activities	3
Total			1,124

Toxic Release Inventory Facilities

The Toxic Release Inventory (TRI) is an EPA database that contains information on toxic chemical releases and other waste management activities reported annually by certain covered industry groups as well as federal facilities (EPA, December 2005c). The purpose of the TRI is to provide information to the public about toxic chemicals in their communities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and expanded by the Pollution Prevention Act of 1990. Section 313 of EPCRA required the EPA and the States to annually collect data on releases and transfers of certain chemicals from industrial facilities and also make this data available for public access. The Pollution Prevention Act required that additional data on waste management and source reduction activities be reported in the TRI.

A facility must report to the TRI if:

- its Standard Industrial Classification (SIC) code is between 20 to 39 or equals to a specific industrial sector as dictated by the EPA; and
- it employs 10 or more full-time employees; and
- it manufactures or processes more than 25,000 pounds or uses more than 10,000 pounds of any listed chemical during the calendar year

There are a total of nine facilities in the District of Columbia that reported to the TRI releases of toxic chemicals in 2003 (EPA, December 2005b). **Table 2.25** shows the amount each of the total amounts of on-site and off-site disposal or releases. These nine TRI facilities reported total releases in 2003 of 13,788 pounds of toxic chemicals. Out of 13,482 pounds of on-site disposal or other releases, 3,338 pounds were fugitive air emissions, 1 pound was point source air emission, 8,062 pounds were surface water discharges, and 2,082 pounds were other surface impoundments.

Table 2.25: TRI Facilities and Total Releases				
Facility	TRIF ID	Total On-site Disposal or Other Releases (lbs)	Total Off-site Disposal or Other Releases (lbs)	Total On- and Off-site Disposal or Other Releases (lbs)
Benning Generating Station	20019BNNG3400B	1	2	3
Buzzard Point Generating Station	20024BZZRD1STVS	0	0	0
Fort Totten Ready-Mix Concrete	20011FRTTT5001F	NA	NA	NA
Superior Concrete Materials (1st and Maryland Ave SE)	20004SPRRC1STAN	0	-	0
Superior Concrete Materials (South Capitol Street SW)	20024SPRRC1601S	0	0	0
USACE Dalecarlia WTP	20315SCDLC5900	8,303	0	8,303
USACE McMillan WTP Aqueduct	20001SCMCM2500F	5,179	2	5,181
US Dept of the Treasury Bureau of Engraving and Printing	20228BRFNG14THC	0	52	52
US Dept of Justice - Alcohol, Tobacco, Firearms and Explosives HQ	20226SDJBR650MA	0	249	249
Total		13,482	306	13,788

Table 2.25 shows the chemicals and the facilities which released them. Of the 306 pounds of off-site disposal or other releases, 207 pounds were sent to RCRA Subtitle C Landfills, 93 pounds (metals only) were solidification/stabilization, 3 pounds (metals only) were transferred to Publicly Owned Treatment Works (POTWs), and 2 pounds were transferred to a waste broker for disposal.

It was reported that these facilities managed a total 102,527 pounds of production-related waste. Most of this waste (87,687 pounds) had been sent off-site to be recycled, while 1,003 pounds had been sent to POTWs for treatment.

Table 2.25: TRI Facilities and Chemicals Released

Chemical	Facility	Total Amount Released (lbs)
Ammonia	Army Corps of Engineers - Dalecarlia WTP	240
	Army Corps of Engineers - McMillan WTP	
Benzo (G,H,I) Perylene	None	0
Chlorine	Army Corps of Engineers - Dalecarlia WTP	3100
	Army Corps of Engineers - McMillan WTP	
Copper Compounds	Army Corps of Engineers - McMillan WTP	1899
Lead	US Dept of Treasury, Bureau of Engraving and Framing	290
	US DOJ Bureau of Alcohol Tobacco Firearms and Explosives	
Manganese Compounds	Army Corps of Engineers - Dalecarlia WTP	8244
	Army Corps of Engineers - McMillan WTP	
Mercury Compounds	Benning Generation Station	1
Nickel Compounds	US Dept of Treasury, Bureau of Engraving and Framing	11
Nitrate Compounds (Listed 1995)	None	0
Polycyclic Aromatic Compounds (Listed 1995)	Buzzard Point Generating Station	2
Total		13788

2.5.3 PLANNING ISSUES

Impacts on the Environment

The presence of toxic chemicals in the environment is detrimental to aquatic biota, wildlife, and human health.

Aquatic Life

In a report written by the Maryland Sea Grant and Maryland Sea Grant Extension, a number of impacts on aquatic life were discussed (Greer, 1995). Bioaccumulation is emphasized, whereby toxins accumulate in an organism. This can occur through respiration, ingestion, or epidermal surface contact. Chemical concentrations are especially high in fatty tissues, liver, and bones. Metals can accumulate in shellfish, due to their ability to filter in metallic waste. These metals will bind to sites on metal-binding proteins, or within tissue granules of shellfish. Many times, benthic phytoplankton and other organisms that make up the base of a food web can accumulate toxins (Greer, 1995). Chemical/metal toxins are able to be spread throughout the food web in this way, as they are passed to higher trophic levels. This is especially true with toxins that do not break down easily, whereby they can exist in a state of bioaccumulation for extremely long periods of time. In this way, all biotic organisms, including fish, can be exposed to bioaccumulation. This may lead to a degradation of an entire ecosystem, as well as creating a health risk for fish consumption. In the District, concentrations of contaminants, particularly PCBs, were found to be particularly high in the American eel, cod, and channel catfish (Davies, 1996). These are all fish that are consumed periodically by anglers (Davies, 1996).

Ecosystems exposed to bioaccumulation of chemical/metal toxins fail for many reasons. The accumulation of these compounds can lead to genetic and carcinogenic effects. Toxicity studies have shown that toxic effects can include reduced growth, increased mortality, genetic mutation, teratogenic effects, or even the molecular deterioration of a species' immune system (Davies, 1996). For instance, polycyclic aromatic hydrocarbons (PAH) can render oysters more vulnerable to parasites. In the Anacostia River, toxics contributed to the development of tumors in fish populations (Davies, 1996). Over time, these results can reduce biomass and species composition, which would eventually lead to lower biotic quality.

Wildlife

Land dwelling wildlife are also affected by the presence of contaminants in the environment. Wildlife that rely upon surface waters for feeding, such as carnivorous bird populations, can be affected. Because plants absorb contaminants in the soil and concentrate them in their leaves, herbivores can be affected as well. Scavengers which infiltrate waste sites are also exposed to potentially hazardous materials.

Human Health

Human health is especially affected by exposure to contaminants. People can be exposed to toxic substances during their day in the following ways (Davies, 1996):

- Contact with contaminated soils while gardening or playing at the playground
- Children ingesting contaminated soils
- Eating vegetables grown in contaminated soils
- Drinking contaminated water
- Eating fish/shellfish that was caught in contaminated waters
- Breathing contaminants as a result of vapor intrusion or groundwater intrusion in homes and work places
- Breathing dust contaminated with toxic substances
- Physical contact with contaminated water

Many of the contaminants found in the District are known carcinogens. It has been found that lead can to developmental problems in children (Versar, Inc., 1997). In fact, children are at greater risk of lead poisoning because they can absorb more than 50 percent of the lead found from water (Davies, 1996). In addition, children have a greater risk to being exposed to lead and other contaminants due to contact with soil.

Spring Valley soil contamination

The Spring Valley neighborhood, adjacent to American University, was used during World War I by the US Army for chemical warfare research and testing. This testing involved detonations and the burying of chemical agents and unexploded ordnance in the area. In the past 90 years, the majority of volatile materials have degraded and are no longer found in soil but some arsenic contamination remains.

The Agency for Toxic Substances and Disease Registry (ATSDR) is currently evaluating the health implications of the contaminated soils while the remediation and clean up is being conducted by the U.S. Army Corps of Engineers (USACE). The remaining pathways of concern are soil ingestion, dust inhalation, and vegetable gardening. The results have thus far concluded that low levels of volatile and semi volatile substances in indoor air pose no apparent public health hazard to adult or child occupants. ATSDR recommended conducting further confirmatory sampling at the property, the first phase focusing on deep and shallow soil gas.

Hazardous Materials Transport through the District

In April of 2005, DDOT published the Terrorism Prevention in Hazardous Materials Transportation Emergency Act of 2005. The Act requires carriers transporting certain ultra-hazardous materials within 2.2 miles of the US Capitol to obtain a permit. The emergency rulemaking will apply only to rail carriers starting April 11, 2005; it will apply to motor vehicle carriers when legal issues are resolved. This legislation originated from concerns over potential terrorist attacks on the US Capitol Building and complex due to the large shipments of ultra-hazardous materials transported by motor vehicle or rail car.

Electromagnetic Field Reduction (EMF)

In the District, the federal sector, local government, commercial industry, and general public rely heavily on radiofrequency services, facilities, and devices. In recent years, this demand has necessitated the location of new antennae on both federal and private land. As a result, District residents are exposed to the electromagnetic fields (EMF) produced by the local build-up of electric charges generated from the telecommunications towers. The spectrum of electromagnetic radiation includes radio waves and microwaves, collectively referred to as radiofrequency, emitted by transmitting antennas.

The World Health Organization reports that the levels of radiofrequency to which people are normally exposed are much lower than those needed to produce significant heating. Cellular installations, especially with tower-mounted antennas, have shown ground-level power densities thousands of times less than the Federal Communications Commission limits for safe exposure (WHO 2003). While as of 2003, the World Health Organization found no adverse health effects from low level, long term exposure to radiofrequency emission, the American Medical Association has recommended a policy of prudent avoidance, suggesting that manufacturers and employers begin reducing the exposure of workers and the public to EMF radiation.

The Zoning Commission for the District of Columbia has established development standards for antenna towers and the NCPC has written guidelines for antenna location on federal property in the National Capital Region. Both sets of guidelines govern the appropriate location of

radiofrequency facilities and devices for functional and aesthetic reasons, protecting the operational needs of federal installations and parkland, and preserving the important viewsheds. The only planning regulations that govern the location of new antennas and towers for human health or safety reasons are found in the NCPC Federal Elements Comprehensive Plan. These policies suggest joint use and collocation of antennae, interior attenuation devices, and prudent avoidance to high exposures of EMF.

Noise Pollution Reduction

The District is a small, dense city with mass transit, traffic congestion, heavy rail transport, extensive construction & development, an adjacent airport and heavy security and military presence. The resulting noise pollution, similar to the plight of other cities, has contributed to the economic decline and reduced property values of certain areas of the city.

The NCPC Comprehensive Plan for the National Capital states that “Noise will continue to be a concern in the absence of policies and technologies that can further mitigate noise levels. The federal government should do its part to reduce its contribution to noise pollution, and should coordinate with local governments to avoid close proximity of noise-generating activities and sensitive uses”.

DDOT’s Urban Forestry Department emphasized that trees absorb and block noise from the urban environment. The DCRA’s Chapter 27 of the Municipal Regulations contains general provisions on noise and maximum levels for three noise zones: residential, commercial/light manufacturing, and industrial zones. Sound level thresholds are based on ANSI specifications for sound level meters.

2.5.4 TRENDS

Future development in the District will necessitate excavation on sites previously inhabited by uses known to produce contaminants. As a result, new contaminated sites may be identified for cleanup and restoration. Cleanup and monitoring programs will continue, providing general improvement of hazardous resources across the District.

Electromagnetic field production will likely increase with new demands, but under FCC regulations will remain well below any damaging level. Noise levels will remain similar to that typically found in an urban environment, with minor increases observed in those areas slated for development or redevelopment.

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